

Museums

Z

7991

287

v.97

no 14

THE ZOOLOGICAL RECORD

THE UNIVERSITY
OF MICHIGAN

MAR 26 1965

MUSEUMS
LIBRARY

VOLUME 97 SECTION 14 1960

PROTOCHORDATA

COMPILED BY

D. B. CARLISLE, D.Sc.

LONDON

PUBLISHED BY

THE ZOOLOGICAL SOCIETY OF LONDON

PRICE THREE SHILLINGS

1963

UNIVERSITY OF MICHIGAN LIBRARIES

It will greatly help in the production of The Zoological Record and assist the Recorders of the individual sections, if authors will forward a copy of their paper or memoir to the Editor of the Zoological Record, The Zoological Society of London, Regent's Park, London, N.W.1. In the case of separately printed copies of articles so forwarded, the original pagination should be given.

All business correspondence concerning the Record should be addressed to the Scientific Director, The Zoological Society of London, Regent's Park, London, N.W.1.

THE MUSEUMS JOURNAL

PUBLISHED BY THE MUSEUMS ASSOCIATION

22 Fitzroy Street, Fitzroy Square, London, W.1.

This journal, which is published monthly, contains articles, reviews and technical notes on every Museum aspect of zoology and other sciences. It is the only English journal which deals with the installation and preservation of exhibits, and which reviews Museum work in all parts of the world.

It is published monthly price 4s., by the Association and can be obtained from the above address. It is distributed free to all members of the Museums Association (Subscription £3 3s. 0d. per annum), of which full particulars are obtainable from the Secretary at the above address.

PROTOCHORDATA

TOGETHER WITH

POGONOPHORA, ENTEROPNEUSTA, GRAPTOLITHINA,
PTEROBRANCHIA AND PHORONIDEA

COMPILED BY

D. B. CARLISLE, D.Sc.

VOL. 97

© Zoological Society of London, 1963.

TI
sam
1900

Al
del
chim
I. N
(NS

Al
olog
Boll
59-9

Al
tivo
di C
Com

Al
mar
quan
parte
Bull

Al
delle
di Z
nazic

Al
Tierr
Verle

ES
& M
en l
Cons
50 à
Médi

Es
Free
22 fig

14. PROTOCHORDATA

COMPILED BY
D. B. CARLISLE, D. Sc.

CONTENTS

	PAGE
I. TITLES	3
II. SUBJECT INDEX	8
III. SYSTEMATIC INDEX	11

I.—TITLES

The year of publication is omitted where it is the same as the volume year of the "Record," namely 1960.

Angelis, C. M. de & Valle, R. D. Il ciclo stagionale del plancton in rapporto alle condizioni fisico-chimiche del Mar Piccolo e del Mar Grande di Taranto. I. Nota preliminare. Boll. Pesca-Piscicoltura. Idrobiol. **35** (NS 14) 1959 [1960]: 21-43 7 figs.

Anichini, C. (1). Risultati delle ricerche planctonologiche effettuate nella stazione fissa di Cagliari. Boll. Pesca-Piscicoltura. Idrobiol. **35** (NS 14) 1959 [1960]: 59-94 11 figs.

Anichini, C. (2). Variazioni qualitative e quantitative dello zooplancton nelle parte orientale del golfo di Cagliari dal Luglio 1956 al Dicembre 1957. Rapp. Comm. int. Mer Médit. **15**: 317-325 4 figs.

Anichini, C. (3). Ricerche di biologia marina nei mari circostanti la Sardegna. IV. Variazioni quantitative e qualitative dello zooplancton nelle parte orientale del Golfo di Cagliari nell'anno 1957. Bull. Inst. océanogr. Monaco no. 1133 1958: 1-10.

Anichini, C. (4). Risultati dei primi dodici mesi delle ricerche planctonologiche eseguite dall'Istituto di Zoologia di Cagliari nell'Anno Geofisico Internazionale. Boll. Zool. **26** 1959: 669-682 9 figs.

Az, P. Entdeckung neuer Organisationstypen im Tierreich. Wittenberg Lutherstadt (A. Ziemsen Verlag): 116 pp. text-figs.

Băcescu, M., Serpoianu, N., Chirilă, V., Skolka, H. & Manea, V. Études physico-chimiques et biologiques en Mer Noire. I. Littoral roumain, secteur est Constanța, entre les parallèles 44° 10' et 43° 49' de 50 à 200 m de profondeur. Rapp. Comm. int. Mer Médit. **15**: 55-64 2 figs.

Bainbridge, V. The plankton of inshore waters of Freetown, Sierra Leone. Fish. Publ. Lond. **13**: 1-47 22 figs.

Barlier, J., Le Maître, D. & Rogier, P. Présence des genres *Ampyz* et *Plumulites* dans le Gothlandien de la bordure nord-est du Tassili N'Adjer: Adrar Ikohahone (bassin de Fort de Polignac). C.R. Acad. Sci. Paris **250**: 4407-4409.

Barrington, E. J. W. & Barron, N. On the organic binding of iodine in the tunic of *Ciona intestinalis* L. J. mar. biol. Ass. U.K. **39**: 513-523 3 figs.

Barron, N. see Barrington, E. J. W.

Battaglia, B., Mozzi, C. & Varagnolo, A. M. Prime osservazioni sul materiale planctonico raccolto durante la crociera talassografica Adriatica del 1955. Rapp. Comm. int. Mer Médit. **15**: 309-315 4 figs.

Bell, L. G. Observations on the development of *Ciona intestinalis*. Proc. N.S. Inst. Sci. **24**: 410.

Berg, W. E. & Humphreys, W. J. Electron microscopy of four-cell stages of the ascidians *Ciona* and *Styela*. Develop. Biol. **2**: 42-60 9 figs.

Berner, L. D. Unusual features in the distribution of pelagic tunicates in 1957 and 1958. Rep. Calif. coop. ocean. Fish. Invest. **7** 1958-9 [1960]: 133-135 4 figs.

Berry, W. B. N. (1). Early Ludlow graptolites from the Ashland area, Maine. J. Paleontol. **34**: 1158-1163, figs.

Berry, W. B. N. (2). Correlation of Ordovician graptolite-bearing sequences. Rep. 21st int. geol. Congr. **7**: 97-108.

Berry, W. B. N. (3). Graptolite faunas of the Marathon region, West Texas. Publ. Univ. Tex. Bur. econ. Geol. **6005**: iv+179 20 pls. figs.

Bolton, T. E. Catalogue of type invertebrate fossils of the Geological Survey of Canada. Ottawa. **1**: 1-215.

Bone, Q. (1). The origin of the chordates. J. Linn. Soc. (Zool.) **44**: 252-269 2 figs. J. comp. Neurol. **115**: 27-64.

Bone, Q. (2). The central nervous system in amphioxus.

- Bone, Q. (3). A note on the innervation of the integument in amphioxus, and its bearing on the mechanism of cutaneous sensibility. *Quart. J. micr. Sci.* **101** : 371-379.
- Bouček, B. Einige Bemerkungen zur Entwicklung der Graptolithenfaunen in Mitteldeutschland und Böhmen. *Geologie* **9** : 556-564.
- Bresciani, J. & Lützen, J. *Gonophysema gullmarensis* (Copepoda parasitica). An anatomical and biological study of an endoparasite living in the ascidian *Ascidella aspersa*. I. Anatomy. *Cah. Biol. mar.* **1** : 157-184 7 pls. 8 figs.
- Brewin, B. I. Ascidiens of New Zealand. Part XIII. Ascidiens of the Cook Strait region. *Trans. roy. Soc. N.Z.* **88** : 119-120.
- Bulbrook, R. D. *see* Corner, E. D. S.
- Bulman, O. M. B. Some morphologically intermediate genera in graptolite phylogeny. *Rept. 21st int. geol. Congr.* **22** : 65-70, figs.
- Burdon-Jones, C. & McIntyre, A. D. *Stereobalanus*, a genus new to the Old World. *Nature, Lond.* **186** : 491-492 1 fig.
- Burdon-Jones, C. & Patil, A. M. A revision of the genus *Saccoglossus* (Enteropneusta) in British waters. *Proc. zool. Soc. Lond.* **134** : 635-645 3 figs.
- Burdon-Jones, C. & Tambs-Lyche, A. Observations on the fauna of the north Brattholmen stone-coral reef near Bergen. *Univ. Bergen Arb. Mat.-Nat. Ser.* **1960** (4) : 1-24.
- Campbell, C. J. *see* McKerron, W. S.
- Carpine, C. Recherches sur les fonds à *Peyssonnelia polymorpha* (Zan.) Schmitz de la région de Marseille. *Bull. Inst. océanogr. Monaco* **1125** 1958 : 1-50.
- Castagna, M. *see* Schwartz, F. J.
- Cavet, P. Le paléozoologie de la zone axiale des Pyrénées Orientales Françaises entre Roussillon et l'Andorre (étude stratigraphique et paléontologique). *Bull. Carte géol. Fr.* **55** 1959 : 1-216 9 pls. figs.
- Chirilă, V. *see* Băcescu, M.
- Clark, A. H. *see* Menzies, R. J.
- Cognetti, G. & Santarelli, M. Ricerche sulle zoocenosi bentoniche del Golfo di Napoli. II. La cosiddetta Secca di San Giovanni a Teduccio. *Boll. Pesca Piscic. Idrobiol* **35** (NS 14) 1959 [1960] : 10-20 2 figs.
- Comte, P. Recherches sur les terrains anciens de la Cordillère Cantabrique. *Mem. Inst. geol. Esp.* **60** 1959 [1960] : viii+440, figs.
- Corner, E. D. S., Leon, Y. A. & Bulbrook, R. D. Steroid sulphatase, arylsulphatase and β -glucuronidase in marine invertebrates. *J. mar. biol. Ass. U.K.* **39** : 51-61.
- Costa, S. Recherches sur les fonds à *Halarachnion spatulatum* de la baie de Marseille. *Vie Milieu* **11** : 1-68 21 figs.
- Covelli, I., Salvatore, G., Sena, L. & Roche, J. Sur la formation d'hormones thyroïdiennes et de leurs précurseurs par *Branchiostoma lanceolatum* Pallas (Amphioxus). *C.R. Soc. Biol., Paris* **154** : 1165-1169.
- Cowper, T. R. Occurrence of *Pyrosoma* on the continental slope. *Nature, Lond.* **187** : 878-879.
- Currie, R. I. *see* Hart, T. J.
- Dalcq, A. M. Nouveaux constituants de l'œuf d'*Ascidie* révélés par les colorants vitaux métachromatiques. *Arch. Biol., Paris* **71** : 93-139 9 pls.
- Dawydoff, C. & Grassé, P.-P. Classe de Phoronidiens. in Grassé, P.-P. : *Traité de Zoologie* **5** (1) 1959 : 1008-1053.
- Deevey, G. B. The zooplankton of the surface waters of the Delaware Bay region. *Bull. Bingham oceanogr. Coll.* **17** (2) : 1-53 19 figs.
- Della Croce, N. Sulla presenza di larve di Anfiosso nel plancton delle acque sud-orientali Sarde. *Boll. Mus. Ist. Biol. Genova (Biol. anim.)* **30** : 15-17.
- Dresnay, R. du & Willefort, S. Présence de Skiddawien à graptolites dans le Haut Atlas oriental (Maroc). *C.R. Acad. Sci., Paris* **250** : 2915-2916.
- Ehrenberg, K. Paläozoologie. *Wien* 408 pp. 175 figs.
- Endean, R. The blood cells of the ascidian, *Phallusia mammillata*. *Quart. J. micr. Sci.* **101** : 177-197 8 figs.
- Ewing, M. *see* Menzies, R. J.
- Fenaux, R. (1). Un Appendiculaire nouveau *Appendicularia tregouboffi* n. sp. recolté dans le plancton de Villefranche-sur-Mer. *Bull. Soc. zool. Fr.* **85** : 120-122 3 figs.
- Fenaux, R. (2). Sur quelques Appendiculaires d'Israël. *Bull. Sea Fish. Res. Sta. Israel* **29** : 3-7.
- Ferruzza, N. F. Fenomeni di induzione nelle Ascidio. *Boll. Zool.* **28** 1959 : 357-363.
- Fize, A. Sur un fond à Amphioxus de la plage de Sète. *Vie Milieu* **11** : 505-507.
- Flügel, E. Graptolithen-Rätselwesen des Erdalters. *Veröff. naturh. Mus. Wien N.F.* **3** : 5-9 9 text-figs.
- Furnestin, M.-L. Zooplankton de Golfe du Lion et la côte orientale de Corse. *Rev. Trav. Off. Pêches marit.* **24** : 153-252 66 figs.
- Geh, M. Y. *see* Mu, A. T.
- George, C. J. The affinities and evolution of the major triploblastic phyla of animals. *J. anim. Morph. Physiol.* **7** : 9-14.
- Godeaux, J. Tuniciers pélagique du Golfe d'Eglath. *Bull. Sea Fish. Res. Sta. Israel* **29** : 9-15.
- Grassé, P.-P. *see* Dawydoff, C.
- Griffith, G. *see* Schwartz, F. J.
- Günther, K. *see* Hertler, K.
- Hall, D. A. Man's links with the sea squirt. *New Scientist* **8** (202) : 860-862 4 figs.
- Hart, T. J. & Currie, R. I. The Benguela Current. "Discovery" *Rep.* **31** : 123-297.

- Herter, K. & Günther, K.** Werner Ulrich. Zool. Beitr. N.F. 5 : 179-198, pl.
- Houghton, D. R. & Millar, R. H.** Spread of the ascidian *Styela mammiculata* Carlisle. Nature, Lond. 185 : 862.
- Humphreys, W. J.** see Berg, W. E.
- Hundt, R.** Das Vorkommen gotlandischer Graptolithenführender Gerölle im Rheintal. Beitr. natur. Forsch. 19 : 132-137.
- Hure, J.** Distribution annuelle du zooplancton sur une station de l'Adriatique méridionale. Acta adriat. 7 (7) 1955 : 1-72.
- Ivanov, A. V. (1).** Embranchement des Pogonophores. in Grassé, P.-P. : Traité de Zoologie 5 (2) : 1521-1622.
- Ivanov, A. V. (2).** [Materials about the ecology and geographical distribution of Pogonophora.] [Russian.] Trud. Inst. Okeanol. 34 : 3-20 2 figs.
- Ivanov, A. V. (3).** [Pogonophores.] [Russian.] Fauna SSSR NS 75 : 271 pp. 3 pls. 176 figs.
- Ivanova-Kazas, O. H.** *Pyrosoma vitjasi* une nouvelle espèce de Pyrosome. Ann. Soc. zool. Belg. 89 (2) 1958-9 [1960] : 273-279 4 figs.
- Jaanusson, V.** Graptoloids from the Ortkan and Viruan (Ordovic.) limestones of Estonia and Sweden. Bull. geol. Inst. Univ. Uppsala 38 : 289-366 5 pls. figs.
- Jaeger, H.** Über *Diversograptus*. Paläont. Z. 34 : 13-14.
- Kanaeva, I. P.** The distribution of plankton along the 30° W meridian in the Atlantic, April-May 1959. in Marti, Yu. Yu. et al. : Soviet investigations in North European species. Moscow (All-Union Research Institute of Marine Fisheries and Oceanography, UNIRO) : 173-184.
- Kernels, A.** Contribution à l'étude faunistique et écologique des herbiers de Posidonies de la région de Banyuls. Vie Milieu 11 : 145-167 14 figs.
- Kobayashi, T.** The Cambro-Ordovician formations and faunas of South Korea. Part VI. Palaeontology V. J. Fac. Sci. Tokyo Univ. Geol. 12 : 217-276 3 pls. figs.
- Kozłowski, R.** *Calyxendrium graptoloides* n. gen., n. sp.—a graptolite intermediate between the Dendroidea and the Graptoloidea. Acta Palaeont. polon. 5 : 107-125.
- Laborel, J. & Vacelet, J.** Étude des peuplements d'une grotte sous-marine du Golfe de Marseille. Bull. Inst. océanogr. Monaco 1120 1958 : 1-20.
- Lawson, J. D.** The succession of shelly faunas in the British Ludlovian. Rep. 21st int. geol. Congr. 7 : 114-125.
- Le Maitre, D.** see Barlier, J.
- Lee, C. K.** see Mu, A. T.
- Legaré, J. E. H. & Maclellan, D. C.** A qualitative and quantitative study of the plankton of the Quoddy region in 1957 and 1958 with special reference to the food of the herring. J. Fish. Res. Bd Can. 17 : 409-448 14 figs.
- Legrand, P.** Sur la présence du genre *Clonograptus* au Sahara septentrional. C.R. Soc. geol. Fr. 1960 : 241-242 1 fig.
- Lemoine, M.** Comparaison de *Distichoplax biserialis* et des *Rhabdopleura* fossiles et actuels. Rev. Micropaleont. 3 : 95-102 2 pls.
- Leon, Y. A.** see Corner, E. D. S.
- Lützen, J.** see Bresciani, J.
- Lynch, W. F. (1).** Factors inhibiting metamorphosis in *Bugula* and *Amaroecium* larvae. Roux' Arch. Entwickl. Mech. Organ. 151 1959 : 164-180.
- Lynch, W. F. (2).** Problems of the mechanism involved in the metamorphosis of *Bugula* and *Amaroecium* larvae. Proc. Iowa Acad. Sci. 67 : 522-531.
- Lynch, W. F. (3).** Factors influencing metamorphosis of larvae of some of the sessile organisms. Proc. 15th int. Congr. Zool. 1959 : 239.
- McIntyre, A. D.** see Burdon-Jones, C.
- McKerrow, W. S. & Campbell, C. J.** The stratigraphy and structure of the lower Palaeozoic rocks of northwest Galway. Sci. Proc. roy. Dublin Soc A1 (3) : 27-52 6 pls. 7 figs.
- Maclellan, D. C.** see Legaré, J. E. H.
- Mancuso, V.** Prime ricerca sulla ultrastruttura dell'uovo delle Ascidie. Boll. Zool. 26 1959 : 329-339.
- Manea, V.** see Băcescu, M.
- Maraglino, G. A. & Stefano, M. de.** Contributo alla conoscenza della digeribilità delle Ascidie eduli. *Thalassia ionica* 3 : 69-82.
- Menzies, R. J., Ewing, M., Worzel, J. L. & Clark, A. H.** Ecology of the recent Monoplacophora. Oikos 10 1959 : 168-182.
- Millar, R. H. (1).** The identity of the ascidians *Styela mammiculata* Carlisle and *S. clava* Herdman. J. mar. biol. Ass. U.K. 39 : 509-511 1 fig.
- Millar, R. H. (2).** *Molgula dolichentera*, a new species of ascidian from eastern Nigeria. Ann. Mag. nat. Hist. (13) 3 : 129-131.
- Millar, R. H. (3).** Ascidacea. "Discovery" Rep. 30 : 1-160 6 pls. 72 figs.
- Millar, R. H.** see Houghton, D. R.
- Minganti, A. (1).** Trapianto del blastomero di ibridi letali di Ascidie del embrioni normali. Boll. zool. 26 1959 : 349-355.
- Minganti, A. (2).** Lo sviluppo di andromerogoni ibridi *Ascidella aspersa* (♀) × *Phallusia mamillata* (♂). R.C. Accad. Lincei (8) 28 : 111-114.
- Mohamed, A. A. A.** see Zapf, K.
- Morton, J. E.** The functions of the gut in ciliary feeders. Biol. Rev. 35 : 92-140 8 figs.
- Mozzi, C.** see Battaglia, B.
- Mu, A. T. (1).** [A preliminary study on the graptolites in the Taitzeho Valley, Liaotung.] [Chinese with English summary.] Acta palaeont. sinica 1 1953 : 23-35 1 pl., figs.

- Mu, A. T. (2).** [Two laterally branched graptolites.] [Chinese with English summary.] Acta palaeont. sinica 1 1953 : 192-200 1 pl.
- Mu, A. T. (3).** [On the Wufeng shale.] [Chinese with English summary.] Acta palaeont. sinica 2 1954 : 153-170 1 pl.
- Mu, A. T. (4).** [On *Spirograptus* Gürich.] [Chinese with English summary.] Acta palaeont. sinica 3 1955 : 1-10.
- Mu, A. T., Lee, C. K. & Geh, M. Y.** [Ordovician graptolites from Xinjiang (Sinkiang).] [Chinese with English summary.] Acta palaeont. sinica 8 : 27-40 3 pls., figs.
- Nakauchi, M.** On the occurrence of *Archidistoma aggregatum* (a colony-forming ascidian) in Pacific waters. Publ. Seto mar. biol. Lab. 8 : 445-449.
- Nicol, J. A. C. (1).** The biology of marine animals. London (Sir Isaac Pitman & Sons Ltd.): xi+707 pp. text-figs.
- Nicol, J. A. C. (2).** The regulation of light emission in animals. Biol. Rev. 35 : 1-42 4 figs.
- Nilsson, R.** A preliminary report on a boring through Middle Ordovician strata in Western Scania (Sweden). Geol. Fören. Stockh. Förh. 82 : 218-226.
- Obut, A. M.** [Correlation of some parts of Estonian Ordovician and Silurian deposits according to graptolites.] [Russian with English summary.] Geol. Inst. Urinuzmed 5 : 143-158 5 pls.
- Oka, H.** Moulting at metamorphosis in ascidians. Bull. mar. biol. Sta. Asamushi 10 : 177-180.
- Oka, H. & Watanabe, H.** Problems of colony-specificity in compound ascidians. Bull. mar. biol. Sta. Asamushi 10 : 153-156.
- Ortolani, G.** Ricerche sulla induzione del sistema nervoso nelle larve delle Ascidie. Boll. Zool. 26 1959 : 341-348 4 figs.
- Parentan, P. (1).** Aspetti biocenotici dei fondi ad alghe litoproduttrici de Mediterraneo. Rapp. Comm. int. Mer Médit. 15 : 87-107.
- Parentan, P. (2).** Su un tipo di fondo non ancora descritto de Mediterraneo : il "fondo a Cidaridi" di "Bocca Piccola" nel Mare di Capri. Thalassia ionica 3 : 83-99.
- Patil, A. M.** see Burdon-Jones, C.
- Péres, J. M. (1).** Rapports sur les travaux récents concernant le benthos méditerranéen. Rapp. Comm. int. Mer Médit. 15 : 9-36.
- Péres, J. M. (2).** Rapport du président sur l'activité du comité Benthos pendant la xvi^e assemblée plénière. Rapp. Comm. int. Mer Médit. 15 : 47-53.
- Péres, J. M. (3).** Études sur le seuil Siculo-Tunisien. I. Recherches sur les peuplements benthiques. Ann. Inst. océanogr. Paris 32 1956 : 233-264.
- Péres, J. M. (4).** Essai de la classement des communautés benthiques marines du globe. Rec. Trav. Sta. mar. Endoume 22 (13) 1957 : 23-54.
- Petitot, M.-L.** Remack- see Remack-Petitot, M.-L.
- Philippot, A. & Riba, O.** Nota sobre la fauna de graptolitos de la Sierra de Albarracín. Estud. geol. Inst. Mallada 8 (16) 1952 : 351-352.
- Picard, J.** Résultats scientifiques des campagnes de la *Calypso*. Les peuplements benthiques des amphores du Grand-Congloué. Ann. Inst. océanogr. Paris 32 1956 : 155-162.
- Rametta, G.** see Roche, J.
- Ramírez, E.** El sinclinal del Guadarranque (Caceres). Contribución al estudio de la estratigrafía del Silurico hispano. Estud. geol. Inst. Mallada 11 (27-28) 1955 : 409-436 4 pls., figs.
- Ranzoli, F.** Ricerche sul comportamento del nucleolo negli ovociti di *Phallusia mamillata* (Cuv.). Caryologia 13 : 247-273 5 figs.
- Rao, S. R. V.** see Seshachar, B. R.
- Remack-Petitot, M.-L.** Contribution à l'étude du Gothlandien du Sahara. Bassin d'Adrar Reggane et de Fort-Polignac. Bull. Soc. geol. Fr. (7) 2 : 230-239 3 figs.
- Riba, O.** see Philippot, A.
- Riedl, R.** Neue nordatlantische Formen von adriatischen Schlammboden. Zool. Anz. 165 : 297-311 5 figs.
- Roche, J., Salvatore, G., Rametta, G. & Varonne, S.** Sur la présence d'hormones thyroïdiennes (3 : 5 : 3'-triiodothyronine et thyroxine) chez un Tunicien (*Ciona intestinalis* L.). C.R. Soc. Biol., Paris 153 : 1751-1757 4 figs.
- Roche, J.** see Covelli, I.
- Rogier, P.** see Barlier, J.
- Rolfe, W. D. I.** The Silurian Inlier of Carmichael, Lanarkshire. Trans. roy. Soc. Edinb. 64 : 245-260 1 pl. 4 figs.
- Romariç, C. (1).** Graptoloides das formações faníticas do Silúrico de entre Douro e Minho. Bol. Soc. geol. Portugal 12 1958 : 23-30 2 pls.
- Romariç, C. (2).** Notas sobre graptoloides portugueses. Bol. Mus. Lab. Min. Geol. Univ. Lisboa 8 : 165-168 1 pl.
- Sabbadin, A. (1).** Analisi genetica del policromatismo di *Botryllus schlosseri* (Pallas) Savigny (Asciadiacea). Boll. Zool. 26 1959 : 221-243 2 pls.
- Sabbadin, A. (2).** Nuove ricerche sull'inversione sperimentale dell' "situs viscerum" in *Botryllus schlosseri* (Asciadiacea). Arch. Oceanogr. Limnol. 12 : 131-143.
- Sabbadin, A. (3).** Ulteriori notizie sull'allevamento e sulla biologia dei Botrilli in condizioni di laboratorio. Arch. Oceanogr. Limnol. 12 : 97-107.
- Sanders, H. L.** Benthic studies in Buzzards Bay. III. The structure of the soft-bottom community. Limnol. Oceanogr. 5 : 138-153 3 figs.
- Salvatore, G.** see Covelli, I.; also see Roche, J.
- Sampelayo, P. H.** Graptolitos Españoles. Notas Inst. geol. Esp. 57 : 3-78 37 pls.
- Santarelli, M.** see Cognetti, G.

- Schwartz, F. J., Castagna, M. & Griffith, G.** Comments on the abundance and ecology of the ascidian *Amaroucium constellatum* in Sinepuxent and Chincoteague Bays. Chesapeake Sci. 1: 197-199 1 fig.
- Sena, L.** see Covelli, I.
- Serpoianu, N.** see Băcescu, M.
- Seshachar, B. R. & Rao, S. R. V.** Ribonucleic acid in the oocytes of the ascidian *Pyura* sp. (Pyruridae: Pleurogonia). Proc. nat. Inst. Sci. India 26B: 135-138 1 pl. 1 fig.
- Skerman, T. M.** Ship fouling in New Zealand waters: a survey of marine fouling organisms from vessels of the coastal and overseas trades. N.Z. J. Sci. 3: 620-648 7 figs.
- Skovington, D.** A new variety of *Orthoretiolites hami* Whittington. Palaeontology 2: 226-235 2 pls., figs.
- Skolka, H.** see Băcescu, M.
- Spassow, H.** Les fossiles de Bulgarie. I. Ère Paléozoïque. Acad. Sci. Bulgarie, Sofia 1958: 90 pp. 16 pls.
- Stefano, M. de** see Maragino, G. A.
- Strachan, I. (1).** L'ontogenèse des graptolites. Bull. Soc. géol.-Fr. (7) 1 1959: 784-786.
- Strachan, I. (2).** The Ordovician and Silurian graptolite zones in Britain. Rep. 21st int. Geol. Congr. 7: 109-113.
- Strachan, I. (3).** Graptolites from the *Ludibundus* Beds (Middle Ordovician) of Tvären, Sweden. Bull. geol. Inst. Univ. Uppsala 38: 47-68 2 pls., figs.
- Strusz, D. L.** The geology of the Parish of Mumbil, near Wellington, N.S.W. J. roy. Soc. N.S.W. 93: 127-136 2 figs.
- Stürmer, W.** Untersuchungen an Kieselschiefer-Grörlen des Maines. Nachr. naturh. Mus. Aschaffenburg 63: 1-26 5 pls.
- Suñer Coma, E.** Los Graptolíticos del Silurico superior de la Cordillera Costera Catalana. I. Santa Creu d'Olorde. Estud. geol. Inst. Mallada 13 (33) 1957: 48-82 figs.
- Sutton, M. F.** The sexual development of *Salpa fusiformis* (Cuvier). Part I. J. embryol. exp. Morphol. 8: 268-290 10 figs.
- Tambs-Lyche, A.** see Burdon-Jones, C.
- Teller, L.** [*Monograptus hereynicus* zone from the Zdanów beds of the Bardo range (Sudetan).] [Polish with English summary.] Acta geol. polon. 10: 325-338, figs.
- Thaddeau, D.** Note sur le Silurien Beiro-Durien. Bol. Soc. geol. Portugal 12 1956: 1-38 10 pls.
- Thomas, D. F.** The zonal distribution of Australian graptolites, with a revised bibliography of Australian graptolites. J. roy. Soc. N.S.W. 94: 1-58 15 pls. 4 figs.
- Tjernik, T. E.** The lower *Didymograptus* shales of the Flagabo drilling core. Geol. Fören. Stockh. Förh. 82: 203-217.
- Tokioka, T. (1, 2).** Contributions to Japanese ascidian fauna. XVI. On some ascidians from the northern waters of Japan and the neighbouring Subantarctic waters. XVII. Ascidians found in the benthonic samples dredged in the Ariake Sea 1957-58. Publ. Seto mar. biol. Lab. 8: 191-204 6 figs.; 205-221 5 pls. 2 figs.
- Tokioka, T. (3).** Droplets from the plankton net. XIX. A glimpse upon chaetognaths and pelagic tunicates collected in the lagoon water near Noumea, New Caledonia. Publ. Seto mar. biol. Lab. 8: 51-53.
- Tokioka, T. (4).** Studies on the distribution of appendicularians and some thaliaceans of the north Pacific, with some morphological notes. Publ. Seto mar. biol. Lab. 8: 351-443.
- Trégouboff, G. (1).** Rapport sur les travaux relatifs à la planctologie Méditerranéenne publiés entre Juillet 1956 et Juin 1958. Rapp. Comm. int. Mer Médit. 15: 191-225.
- Trégouboff, G. (2).** Prospection biologique sous-marine dans la région de Villefranche-sur-Mer au cours de l'année 1957. I. Plongées en bathyscaphe. Bull. Inst. océanogr. Monaco 1117 1958: 1-37.
- Tung, T. C., Wu, S. C. & Tung, Y. Y. F.** [The presumptive areas of the egg of amphioxus.] [Chinese with English abstract.] Acta Biol. esp. Sinica 7: 81-92 13 figs.
- Tung, Y. Y. F.** see Tung, T. C.
- Turner, J. C. M.** Faunas Graptolíticas de América del Sur. Rev. Asoc. geol. argent. 14: 1-180 9 pls., figs.
- Urbanek, A. (1).** [Some observations on the morphology of Monograptidae.] [Polish with English summary.] Acta geol. polon. 4 1954: 291-306 20 figs.
- Urbanek, A. (2).** [An attempt at biological interpretation of evolutionary changes in graptolite colonies.] [Polish with English summary.] Acta palaeont. polon. 5: 127-234 3 pls., figs.
- Vacelet, J.** see Laborel, J.
- Valle, R. D.** see Angelis, C. M. de.
- Van Zyl, R. P.** A preliminary study of the salps and doliolids off the west and south coasts of South Africa. Invest. Rep. Div. Fish S. Afr. 40: 1-31 12 figs.
- Varagnolo, A. M.** see Battaglia, B.
- Varonne, S.** see Roche, J.
- Watanabe, H.** see Oka, H.
- Waterlot, G.** Sur la présence d'un galet de schiste à Dichograptide (*Tetragraptus*) dans les alluvions de la Meuse, à Mézières (Ardennes), et sur la possibilité de l'appartenance du Massif de Givon à l'Ordovician inférieur. Ann. Soc. geol. Nord 79 1959: 6-13 1 pl., figs.
- Wiborg, K. F.** Investigations on zooplankton in Norwegian waters and in the Norwegian Sea during 1957-58. Fiskeridir. Skr. Havundersøk. 12: 1-19 16 figs.
- Willefort, S.** see Dresnay, R. du.

Worsel, J. L. *see* Menzies, R. J.

Wu, S. C. *see* Tung, T. C.

Zapt, K. & Mohamed, A. A. A. The ultrastructural organisation of the elastic component in muscle of *Branchiostoma lanceolatum* (Amphioxus) with special reference to the H-zone. *Proc. Egypt. Acad. Sci.* 14 : 38-44 4 pls. 2 figs.

II.—SUBJECT INDEX

Reference to "Titles" is by the name of the Author. The main groups are indexed separately.

GENERAL

Textbooks.—NICOL (1).

Origin of chordates.—BONE (1) ; chordates descended from annelid stock.—GEORGE.

Palaeozoic protochordates from Bulgaria.—SPASSOW.

POGONOPHORA

GENERAL

Monograph.—IVANOV (3).

Textbooks.—AX, IVANOV (1, 3), NICOL (1).

Bibliography.—IVANOV (3).

Obituary.—W. Ulrich, HERTER & GÜNTHER.

STRUCTURE

All organ systems, techniques.—IVANOV (1, 3), AX.

PHYSIOLOGY

Feeding, excretion.—IVANOV (1, 3).

DEVELOPMENT

IVANOV, (1, 3), AX.

ECOLOGY

IVANOV (1, 3).

EVOLUTION

Phylogeny.—BONE (1), IVANOV (1, 3).

DISTRIBUTION

IVANOV (1-3).

PHORONIDEA

Textbook.—DAWYDOFF & GRASSÉ, NICOL (1).

RECENT HEMIChORDATA

GENERAL

Textbook.—NICOL (1).

Saccoglossus revised.—BURDON-JONES & PATIL.

STRUCTURE

Saccoglossus.—BURDON-JONES & PATIL.

Rhabdopleura compared with †*Distichoplax*.—LEMOINE.

Gut.—Review, MORTON.

PHYSIOLOGY

Ciliary feeding.—Review, MORTON.

EVOLUTION

Phylogeny.—BONE (1).

ECOLOGY

Saccoglossus merschkowskii.—RIEDL.

Rhabdopleura compared with †*Distichoplax*.—LEMOINE.

Population study.—Enteropneusta of Massachusetts, SANDERS.

DISTRIBUTION

MARINE

ARCTIC.—*Saccoglossus merschkowskii*, RIEDL.

NORTH TEMPERATE.—N.W. Atlantic : Enteropneusta in Britain, BURDON-JONES & PATIL; *Stereobalanus* sp. in Scotland, first record for Old World, BURDON-JONES & McINTYRE; *Rhabdopleura* in Norway, BURDON-JONES & TAMBS-LYCHE; N.E. Atlantic : Enteropneusta of Massachusetts, SANDERS; Mediterranean : *Saccoglossus merschkowskii* in Adriatic, RIEDL.

GRAPTOLITHINA

GENERAL LITERATURE

Textbooks.—EHRENBERG.

Bibliography.—Palaeontology of eastern Pyrenees, CAVEY; Australian graptolites, THOMAS.

Principles of nomenclature. — Nomenclatorial studies : *Spinograptus*, MU (4).

Catalogue of type specimens.—Geological Survey of Canada, BOLTON.

Fauna lists.—Central Germany, BOUČEK; Estonia and Sweden, JAANUSSON; Ludlovian of Maine, U.S.A., BERRY (1); West Texas, U.S.A., BERRY (2).

STRUCTURE

Calyxodendrum gen. nov., KOZŁOWSKI; *Dicranograptus* and *Dimorphograptus*, structure in relation to graptolite phylogeny, BULMAN; *Diversograptus*, JAEGER; morphology of Monograptidae, URBANEK (1); origin of nema, KOZŁOWSKI; South American graptolites described and fig'd, TURNER; problems of morphological organization in graptolite colonies, URBANEK (2).

DEVELOPMENT

Ontogeny.—STRACHAN (1).

EVOLUTION & GENETICS

Origin of Graptolithina.—BONE (1).

Origin of Graptolithoidea.—KOZŁOWSKI.

Phylogeny.—Evolution of graptolites, THOMAS; phylogenetic relationships of Dendrograptidae, MU (1); evolutionary trends in Monograptidae, URBANEK (2); *Dicranograptus* and *Dimorphograptus* in graptolite phylogeny, BULMAN.

Genetics.—Genetic mechanisms of evolution of organization in graptolite colonies, URBANEK (2).

Classification.—Monograptidae, MU (4).

ECOLOGY

Mode of occurrence of graptolites.—THOMAS.

DISTRIBUTION

1.—GEOGRAPHICAL

Europe.—Great Britain: Ordovician and Silurian graptolite zones in Britain, STRACHAN (1); graptolites in determination of Ludlovian succession in Britain, LAWSON; Palaeozoic graptolite zones in Killary Harbour to Lough Corrib, Galway, McKERRROW & CAMPBELL; Silurian graptolites of Carmichael, Lanarkshire, Rolfe; **Scandinavia:** SWEDEN: Ordovician graptolites, JAANUSSON, from Western Scania, NILSSON, from Tvären, STRACHAN (3); *Didymograptus* shales from S.E. Skåne, TERNIK; **Western Europe:** CZECHOSLOVAKIA: Silurian graptolites from Bohemia, BOUČEK; FRANCE: Palaeozoic graptolites from the region of the Pyrenees between Andorra and Roussillon, CAVET; Ordovician *Tetragraptus* from Mézières, WATERLOT; GERMANY: Silurian graptolites from Central Germany, BOUČEK; Gothlandian graptolites from the Rhine valley, HUNDT, from the River Maine, STÜRMER; PORTUGAL: Ordovician graptolites, ROMIRIZ (2), THADEAU; Silurian graptolites, ROMIRIZ (1); SPAIN: Palaeozoic graptolites from the Pyrenees, CAVET; graptolites from the Cordillera Cantabrique, COMTE; graptolite faunas of the Sierra de Albarracín, PHILPOTT & RIBA; Silurian graptolites, SAMPelayo, from the Guadarranque syncline, Cáceres, RAMÍREZ, from the coastal Catalan chain of mountains, SUÑER COMA; **Eastern Europe:** ESTONIA: Ordovician graptolites, JAANUSSON, OBUT; Silurian graptolites, OBUT; POLAND: *Calyxendron* gen. nov. from the middle Ordovician, KOZŁOWSKI; *Monograptus hercynicus* zone in the Silurian of the Bardo range (Sudetan), TELLER.

Asia.—China: graptolites from the Taitzeo valley, Liaotung valley, N.E. China, MU (1); two laterally branched Ordovician graptolites from Hunan and Kansu, MU (2); Ordovician graptolites from the Yangtze valley, MU (3), from Sinkiang, MU, LEE & GEH; KOREA: Ordovician graptolites, KOBAYASHI.

Africa.—Silurian graptolites from the Atlas Mts. Morocco, DRESNAY & WILLEFERT; *Clonograptus* in the Silurian of the Sahara, LEGRAND; general notes on graptolites in the Silurian of the Sahara, REMACK-PETTITOT; Llandoveryan graptolites in the Sahara, BARLIER *et al.*

North America.—U.S.A.: Silurian graptolites from Ashland, Maine, BERRY (1); Ordovician graptolites from the Marathon region, West Texas, BERRY (3); Ordovician *Orthoretiolites* from Crier Hills, Oklahoma, SKEVINGTON.

South America.—Ordovician and Silurian graptolites, TURNER.

Australia.—Ordovician graptolites from Mumbil, Wellington, N.S.W., STRUSZ; zonal distribution of Australian graptolites, THOMAS.

2.—GEOLOGICAL

Palaeozoic.—Pyrenees, CAVET.

Cambrian.—Liaotung, N.E. China, MU (1).

Ordovician.—*Calyxendron* gen. nov., Poland, KOZŁOWSKI; *Orthoretiolites* Oklahoma, SKEVINGTON; *Tetragraptus* Mézières, WATERLOT; correlation of

graptolite-bearing sequences, BERRY (2); Texas, BERRY (3); Oriskany and Viruan graptoloids from Estonia and Sweden, JAANUSSON; Korea, KOBAYASHI; graptolite zones in Galway, Ireland, McKERRROW & CAMPBELL; Liaotung, N.E. China, MU (1); two laterally branched graptolites from China, MU (2); Wufeng shale, China, MU (3); Sinkiang, China, MU, LEE & GEH; Sweden, NILSSON; Estonia, OBUT; Portugal, ROMIRIZ (2); graptolite zones in Britain, STRACHAN (2); *Ludibundus* beds of Sweden, STRACHAN (3); Wellington, N.S.W., Australia, STRUSZ; list of Australian, THOMAS; South America, TURNER; **Arenigian & Tremadocian:** *Clonograptus* in Tremadocian of the Sahara, LEGRAND; Arenigian *Didymograptus* shales in Sweden, TERNIK; **Llanvirnian:** Spain, PHILPOTT & RIBA.

Silurian.—Faunas from Germany and Bohemia: BOUČEK; Spain, COMTE, SAMPelayo, SUÑER COMA; Morocco, DRESNAY & WILLEFERT; photographs and general notes, FLÜGEL; Rhine valley, HUNDT; graptolite zones in Galway, Ireland, McKERRROW & CAMPBELL; Estonia, OBUT; Sahara, REMACK-PETTITOT; Cáceres, Spain, RAMÍREZ; Portugal, ROMIRIZ (1), THADEAU; graptolite zones in Britain, STRACHAN (1); Germany, STÜRMER; *Monograptus hercynicus* zone of the Zdanów beds, Poland, TELLER; list of Australian, THOMAS; South America, TURNER; **Llandoveryan:** Saharan graptolites, BARLIER *et al.*; **Wenlockian:** Polish Monograptidae, URBANEK (1); **Ludlovian:** Maine, U.S.A., BERRY (1); succession of shelly faunas in Britain and importance of graptolites in zonation, LAWSON; Lanarkshire, Scotland, ROLFE; Polish Monograptidae, URBANEK (1).

TUNICATA

GENERAL

Semi-popular article.—Asciadiacea: HILL.

Textbook.—NICOL (1).

Bibliography.—Asciadiacea: PÉRES (1, 2); Thaliacea, Larvacea: TRÉGOUBOFF (1).

Reviews.—Gut and ciliary feeding, MORTON; Asciadiacea: PÉRES (1, 2); Thaliacea, Larvacea: TRÉGOUBOFF (1).

Collections.—Asciadiacea: Subantarctic and Antarctic, MILLAR (3), Japan, TOKIOKA (2), Bering Sea, Kamchatka, Japan, TOKIOKA (1); Thaliacea, Larvacea: plankton of Delaware Bay, U.S.A., DEEVEY, New Caledonia, TOKIOKA (3).

Fauna lists.—Asciadiacea: Norwegian Coral reef: BURDON-JONES & TAMBS-LYCHE, Cook Strait New Zealand, BREWIN; Thaliacea, Larvacea: plankton of Delaware Bay, DEEVEY, New Caledonia, TOKIOKA (3).

Food for man.—Asciadiacea: MARAGLINO & STEFANO.

Plankton.—Thaliacea: TOKIOKA (4), TRÉGOUBOFF (1, 2), Sardinia, ANICHINI (2-4), Sierra Leone, BAINBRIDGE, doliolids of California, BERNER, Delaware Bay, DEEVEY, Gulf of Lyons, Corsica, FURNESTIN, Red Sea, GODEAUX, Adriatic, HURE, salps in mid-Atlantic, KANAIEVA, New Caledonia, TOKIOKA (3), Norwegian Sea, WIBORG; Larvacea: ANGELIS & VALLE, BATTAGLIA *et al.*, TRÉGOUBOFF (1), TOKIOKA (4), Sardinia, ANICHINI (1-3), Delaware Bay, DEEVEY, Red Sea, FENAUX, Gulf of Lyons,

Corsica, FURNESTIN, Benguela Current, HART & CURRIE, Adriatic, HURE, Canada, LEGARÉ & MACLELLAN, New Caledonia, TOKIOKA (3).

STRUCTURE

Adult.—*Pyrosoma*, IVANOVA-KAZAS; *Larvacea*: FENNAUX.

Size.—Asciacea: MILLAR (3), PARENZAN (2).

Test.—Asciacea: chemical composition, cellulose, HALL, colour of *Botryllus*, SABBADIN (1).

Blood.—Asciacea: ENDEAN.

Gut.—Review, MORTON; *situs inversus viscerum* in *Botryllus*, SABBADIN (2).

Light organs.—*Pyrosoma*, NICOL (2).

Structural biochemistry.—Asciacea: BARRINGTON & BARRON, MARAGLINO & STEFANO, pigments of *Botryllus*, SABBADIN (1), RNA in oocytes, SESHACHAR & RAO.

Laboratory technique.—Culture of *Botryllus*, SABBADIN (3).

Cytology, histology, histochemistry.—Asciacea: DALCQ, blood cells, ENDEAN, histochemistry of egg, RANZOLI, RNA in oocytes, SESHACHAR & RAO.

Electron microscopy.—Asciacea: egg, BERG & HUMPHREYS, blood cells, ENDEAN.

PHYSIOLOGY

Feeding.—MORTON.

Hormones.—Thyroid hormones in *Ciona*, ROCHE *et al.*

Growth.—Colony fusion in *Botryllus*, OKA & WATANABE.

Biochemistry.—Asciacea: BARRINGTON & BARRON, CORNER *et al.*, ribonucleoproteins in oogenesis, RANZOLI.

Colour, pigments.—*Botryllus*, SABBADIN (1); *Thaliacea*, *Larvacea*: TOKIOKA (4).

Enzymes.—Asciacea: CORNER *et al.*

Luminescence.—*Thaliacea*: NICOL (2).

Experimental studies.—Colony fusion in *Botryllus*, OKA & WATANABE.

Laboratory technique.—Culture of *Botryllus*, SABBADIN (3).

REPRODUCTION

Sexual.—*Thaliacea*: SUTTON.

Asexual.—Asciacea: budding in *situs inversus viscerum* in *Botryllus*, SABBADIN (2); *Thaliacea*: Blastogenesis of *Pyrosoma*, IVANOVA-KAZAS, endogenous budding of salps, SUTTON.

Hybridization.—Asciacea: MINGANTI (1, 2).

Breeding season.—Asciacea: BREWIN.

DEVELOPMENT

Egg, oogenesis.—Asciacea: ultrastructure of egg, MANCUSO, cytochemistry and nucleolus, RANZOLI, RNA in oocytes, SESHACHAR & RAO; *Thaliacea*: SUTTON.

Fertilization.—Asciacea: DALCQ, hybrids of *Ascidella* and *Phallusia*, MINGANTI (2).

Cleavage.—Asciacea: DALCQ, electron microscopy, BERG & HUMPHREYS; *Thaliacea*: SUTTON.

Embryology.—Asciacea: BELL, DALCQ, experimental embryology, MANCUSO, ORTOLANI, of C.N.S., MINGANTI (1), hybrids of *Ascidella* and *Phallusia*, MINGANTI (2); *Thaliacea*: SUTTON.

Organizers, induction.—Asciacea: FERRUZZA.

Chemical embryology.—Asciacea: BELL, FERRUZZA, LYNCH (1, 2).

Organogeny.—Asciacea: hybrids of *Ascidella* and *Phallusia*, MINGANTI (2), C.N.S., MANCUSO, MINGANTI (1), ORTOLANI; *Thaliacea*: SUTTON.

Metamorphosis.—Asciacea: BELL, LYNCH (1-3), moulting, OKA.

Moulting.—Asciacea: at metamorphosis, OKA.

Teratology.—*Situs inversus viscerum* in *Botryllus*, SABBADIN (2).

EVOLUTION & GENETICS

General theories.—BONE (1).

Phylogeny.—BONE (1).

Genetics.—Asciacea: colony-fusion in *Botryllus*, OKA & WATANABE, colour patterns of *Botryllus* simple Mendelian inheritance, SABBADIN (1).

ECOLOGY & HABITS

Ecology.—Asciacea: BĂCESCU *et al.*, CARPINE, COSTA, KERNEIS, LABOREL & VACELET, PARENZAN (1, 2), PÉRÈS (3), *Amaroucium constellatum* on U.S. Atlantic coast, SCHWARTZ *et al.*; *Thaliacea*: TOKIOKA (4), TRÉGOUBOFF (2), VAN ZYL, Gulf of Lyons and Corsica, FURNESTIN, Adriatic, HURE; *Larvacea*: TOKIOKA (4), Gulf of Lyons, Corsica, FURNESTIN, Adriatic, HURE.

Ecological associations.—Asciacea: CARPINE, COSTA, KERNEIS, LABOREL & VACELET, PARENZAN (1, 2), PÉRÈS (3, 4), PICARD *Amaroucium constellatum*, SCHWARTZ *et al.*, fouling communities in New Zealand, SKERMAN.

Habitat.—Asciacea: COGNETTI & SANTARELLI, COSTA, *Amaroucium constellatum*, SCHWARTZ *et al.*; *Thaliacea*: *Pyrosoma*, COWPER.

Effects of environment.—Asciacea: COGNETTI & SANTARELLI, MILLAR (3).

Annual cycle.—Asciacea: CARPINE; *Thaliacea*: ANICHINI (2, 3), Adriatic plankton, HURE; *Larvacea*: ANGELS & VALLÉ, ANICHINI (2, 3), Adriatic plankton, HURE.

Distribution.—Asciacea: MILLAR (3); *Thaliacea*, *Larvacea*: TOKIOKA (4).

Dispersal.—Asciacea: HOUGHTON & MILLAR; *Thaliacea*: doliolids off California, BERNER.

Feeding.—MORTON.

Population studies.—Asciacea: BĂCESCU *et al.*, benthos of Massachusetts, SANDERS; *Thaliacea*, *Larvacea*: ANICHINI (2), TOKIOKA (4), Adriatic plankton, HURE.

Parasites.—BREWIN, parasitic crustacean, BRESCIANI & LÜTZEN.

Aquaria.—Culture of *Botryllus*, SABBADIN (3).

Plankton indicators.—VAN ZYL.

Fouling.—Asciacea: New Zealand, SKERMAN.

DISTRIBUTION

A.—MARINE

ARCTIC.—Asciacea: TOKIOKA (1); Larvacea: TOKIOKA (4).

NORTH TEMPERATE.—N.E. Atlantic: Asciacea: BURDON-JONES & TAMBS-LYCHE, HOUGHTON & MILLAR, MILLAR (1); Thaliacea: Norwegian Sea, WIDBERG; N.W. Atlantic: Asciacea: Massachusetts, SANDERS, *Amaroucium* from Maryland, SCHWARTZ *et al.*; Thaliacea: DEEVEY, salps from N. Atlantic Current, KANAËVA; Larvacea: DEEVEY; Mediterranean: Asciacea: CARPINE, COGNETTI & SANTARELLI, COSTA, KERNEIS, LABOREL & VACILET, PARENZAN (1, 2), PÈRES (1-3); Thaliacea: ANICHINI (2, 3), TRÉGOUBOFF (1), Sardinia, ANICHINI (4), Gulf of Lyons, Corsica, FURNESTIN, Adriatic, HURE; Larvacea: ANGELIS & VALLE, ANICHINI (1), FENAUX, Adriatic, BATTAGLIA *et al.*, HURE, Gulf of Lyons, Corsica, FURNESTIN; Black Sea: Asciacea: BĂCESCU *et al.*, N.E. Pacific: Asciacea: TOKIOKA (1); Thaliacea: TOKIOKA (4); doliolids off California, BERNER; Larvacea: TOKIOKA (4); N.W. Pacific: Asciacea: MILLAR (1), NAKAUCHI, Japan, TOKIOKA (2); Thaliacea, Larvacea: TOKIOKA (4).

TROPICAL.—Atlantic: Asciacea: MILLAR (2); Thaliacea: TOKIOKA (4), Sierra Leone, BAINBRIDGE, salps in Azores Current and S. Trade Current, KANAËVA; Larvacea: TOKIOKA (4), Sierra Leone, BAINBRIDGE; Indo-Pacific: Thaliacea: TOKIOKA (4), Red Sea, GODEAUX; Larvacea: TOKIOKA (4), Red Sea, FENAUX (2); Polynesian Seas: Thaliacea, Larvacea: TOKIOKA (4), New Caledonia, TOKIOKA (3); E. Pacific: Asciacea: in Milne-Edwards Trench, MENZIES *et al.*; Thaliacea, Larvacea: TOKIOKA (4).

SOUTH TEMPERATE.—Asciacea: MILLAR (3); New Zealand, BREWIN, SKERMAN; Thaliacea: *Pyrosoma* of continental slope off Australia, COWPER, S. Africa, VAN ZYL.

SUBANTARCTIC.—Asciacea: MILLAR (3); Thaliacea, Larvacea: TOKIOKA (4).

ANTARCTIC.—Asciacea: MILLAR (3).

B.—BATHYMETRIC

Asciacea: MILLAR (3), associated with *Neopilina* around 6,000 m, MENZIES *et al.*; Thaliacea: TOKIOKA (4), TRÉGOUBOFF (2), *Pyrosoma* on continental slope, COWPER; Larvacea: TOKIOKA (4), TRÉGOUBOFF (2).

CEPHALOCHORDATA

GENERAL

Textbook.—NICOL (1).

Plankton.—Larvae off Sardinia, DELLA CROCE.

STRUCTURE

Gut.—Review, MORTON.

Central nervous system.—BONE (2).

Innervation of integument.—BONE (3).

Ultrastructure of muscle.—ZAFF & MOHAMED.

PHYSIOLOGY

Ciliary feeding.—Review, MORTON.

Senses.—BONE (3).

Thyroid hormones.—COVELLI *et al.*

EMBRYOLOGY

Presumptive areas of egg.—TUNG *et al.*

ECOLOGY

FIZE, —PÈRES (4).

EVOLUTION

Phylogeny.—BONE (1).

DISTRIBUTION

MEDITERRANEAN.—Sète, FIZE; larvae off Sardinia, DELLA CROCE.

III.—SYSTEMATIC INDEX

PHYLUM POGONOPHORA

Monographic account, IVANOV (3), textbooks, IVANOV (1), AX.

Brachiata, AX, a junior objective synonym of Phylum Pogonophora, IVANOV (3).

Order Athecanephria

AX, IVANOV (1), diagnosis, key to families and genera, IVANOV (3).

Oligobrachiidae

AX, IVANOV (1), keys, diagnosis, IVANOV (3).

Birsteinia, IVANOV (1), diagnosis, oligobrachiid affinities, IVANOV (3); *B. vitjasi*, IVANOV (1), ecology, geographical and bathymetrical distribution, IVANOV (2), desc'd and fig'd, IVANOV (3).

Oligobrachia, AX, IVANOV (1), diagnosis, IVANOV (3); *O. dogieli*, AX, IVANOV (1), ecology, geographical and bathymetrical range, IVANOV (2), desc'd and fig'd, IVANOV (3).

Siboglinidae

AX, IVANOV (1), diagnosis, IVANOV (3).

Siboglinum, AX, IVANOV (1), diagnosis, key to species, IVANOV (3). *S. atlanticum*, IVANOV (1-3); *S. bogorovi* sp. nov. New Zealand, depth 3,013 m IVANOV (3) pp. 177-180 fig. 123, ecology and distribution, IVANOV (2); *S. buccelliferum* sp. nov. Coral Sea Pacific, depth 960 m IVANOV (3) pp. 160-163 fig. 115, IVANOV (1), ecology and distribution, IVANOV (2); *S. caulleryi*, AX, IVANOV (1), ecology and distribution, IVANOV (2), desc'd and fig'd IVANOV (3); *S. cinctum*, IVANOV (1), ecology and distribution, IVANOV (2), desc'd and fig'd IVANOV (3); *S. ekmani*, AX, IVANOV (1), ecology and distribution, IVANOV (2), desc'd and fig'd, IVANOV (3); *S. fedotovi*, IVANOV (1-3); *S. frenigerum* sp. nov. Coral Sea Pacific, depth 960 m IVANOV (3) pp. 151-153 fig. 110, IVANOV (2); *S. hyperboreum* sp. nov. Greenland Sea, depth 217 m IVANOV (3) pp. 170-172 fig. 120, IVANOV (1-2); *S. inerme* [as *S. inermis*] IVANOV (1-3); *S. japonicum* sp. nov. N. Pacific, depth 1,680 m IVANOV (3) pp. 142-145 fig. 105, IVANOV (2);

S. meridiale sp. nov. [as *S. meridialis*] Indian Sector of Antarctic Ocean, depth 200–1,200 m IVANOV (3) pp. 166–167 fig. 118, IVANOV (2); *S. microcephalum* sp. nov. Coral Sea Pacific, depth 2,028 m IVANOV (3) pp. 163–166 figs. 116, 117, IVANOV (2); *S. minutum*, IVANOV (1–3); *S. norvegicum* sp. nov. Shetlands and Norway, depth 1,165 m IVANOV (3) pp. 183–186 fig. 126, IVANOV (2); *S. pellucidum*, AX, IVANOV (1–3); *S. pinnulatum* sp. nov. Molucca Is. Pacific, depth 260 m IVANOV (3) pp. 134–136 fig. 100, IVANOV (2); *S. plumosum*, IVANOV (1–3); *S. pusillum* sp. nov. Kuril Is. N. Pacific, depth 5,529 m IVANOV (3) pp. 158–160 fig. 114, IVANOV (2); *S. robustum* sp. nov. Coral Sea Pacific, depth 960 m IVANOV (3) pp. 186–188 fig. 127, IVANOV (1–2); *S. taeniaphorum* sp. nov. Molucca Is. Pacific, depth 260 m IVANOV (3) pp. 188–192 figs. 128–130, IVANOV (1, 2); *S. tenue* sp. nov. [as *S. tenuis*] New Zealand, depth 2,072–3,013 m IVANOV (3) pp. 172–174 fig. 121, IVANOV (1, 2); *S. variabile* sp. nov. [as *S. variabilis*] New Zealand, depth 2,072–3,013 m IVANOV (3) pp. 175–177 fig. 122, IVANOV (2); *S. vinculatum* sp. nov. Tasman Sea S. Pacific, depth 1,225–1,740 m IVANOV (3) pp. 145–148 figs. 106–107, IVANOV (2); *S. weberi* IVANOV (1), ecology and distribution, IVANOV (2), desc'd and fig'd, a mixture of spp. IVANOV (3).

Order Thecanephria

AX, IVANOV (1), diagnosis, key to families and genera, IVANOV (3).

Polybrachiidae

AX, IVANOV (1), diagnosis, key to genera, IVANOV (3).

Cyclobranchia gen. nov. IVANOV (3) pp. 215–216, genotype *C. auriculata*; *C. auriculata* sp. nov. Coral Sea Pacific, depth 7,974–8,006 m IVANOV (3) p. 216 figs. 145–147, IVANOV (1, 2).

Diplobranchia gen. nov. IVANOV (3) pp. 219–220, genotype *D. japonica*, IVANOV (1); *D. belajevi* sp. nov. Indian Ocean, depth 580 m IVANOV (3) pp. 223–226 fig. 152, IVANOV (1, 2); *D. capillaris* [as *Polybrachia*] IVANOV (2, 3); *D. japonica* sp. nov. N. Pacific, depth 7,450–7,520 m IVANOV (3) p. 220 figs. 148–151, IVANOV (2).

Galathealimum, AX, IVANOV (1), diagnosis, IVANOV (3); *G. bruuni*, IVANOV (1–3).

Heptabranchia, AX, IVANOV (1), diagnosis, key to species, IVANOV (3); *H. abyssicola*, IVANOV (1–3); *H. beringensis* sp. nov. Bering Sea, depth 211–215 m IVANOV (3) pp. 211–215 figs. 142–144, IVANOV (2); *H. gracilis*, AX, IVANOV (1–3); *H. subtilis*, AX, IVANOV (1–3).

Krampolinum, AX, IVANOV (1), junior subjective synonym of *Polybrachia*, IVANOV (3).

Polybrachia, AX, IVANOV (1), diagnosis, key to spp. IVANOV (3); *P. annulata*, AX, IVANOV (1–3); *P. barbata*, IVANOV (1–3); *P. capillaris* see *Diplobranchia*; *P. gorbunovi*, AX, IVANOV (1–3).

Zenkevitchiana, AX, IVANOV (1), diagnosis, IVANOV (3); *Z. longissima*, AX, IVANOV (1–3).

Lamellisabellidae

AX, IVANOV (1), diagnosis, IVANOV (3).

Lamellisabella, AX, IVANOV (1), diagnosis, key to spp. IVANOV (3); *L. gorbunovi* = *Polybrachia gorbunovi* g.s. IVANOV (3); *L. ivanovi*, IVANOV (2, 3); *L. johannsoni*, *L. zachai*, AX, IVANOV (1–3).

Spirobrachiidae

AX, IVANOV (1), diagnosis, IVANOV (3).

Spirobrachia, AX, IVANOV (1), diagnosis, key to spp. IVANOV (3); *S. beklemischevi*, AX, IVANOV (1–3); *S. grandis*, IVANOV (1–3).

PHYLUM PHORONIDEA

No relationship to Pterobranchia, textbook, DAWYDOFF & GRASSÉ.

Phoronidae

Actinotrocha branchiata, *A. hippocrepia*, *A. pallida*, textbook, DAWYDOFF & GRASSÉ.

Phoronis, Nicol (1), textbook, DAWYDOFF & GRASSÉ; *P. architecta*, *P. australis*, *P. hippocrepia*, *P. iijimai*, *P. mülleri*, *P. ovalis*, *P. pacifica*, *P. psammophila*, *P. sabatieri*, *P. vancouverensis*, textbook, DAWYDOFF & GRASSÉ.

Phoronopsis, *P. harmeri*, textbook, DAWYDOFF & GRASSÉ.

PHYLUM HEMICHORDATA

Phylogeny, BONE (1).

Class PTEROBRANCHIA

Compared with Pogonophora, AX; no relationship to Phoronidea, DAWYDOFF & GRASSÉ; †general note, EHRENBERG.

Rhabdopleuridae

†General note, EHRENBERG.

Rhabdopleura, BARRINGTON & BARRON, compared with Pogonophora, IVANOV (3), gut and feeding, MORTON, fossil and recent, structure and ecology compared with †*Distichoplax biserialis*, LEMOINE; *R. normani* Norway, BURDON-JONES & TAMBS-LECHE.

Cephalodiscidae

†General note, EHRENBERG.

Class †GRAPTOLITHINA

The classification used is that of BULMAN (1955).

Zonal fossils used in the correlation of Ordovician sequences BERRY (2); catalogue of type specimens in the Geological Survey of Canada BOLTON; general survey from the Silurian of Germany and Bohemia BOUČEK; general note, structural details fig'd EHRENBERG; general study of diversity of form, distribution, age photographs and general notes FRÜGEL.

Ditheroidea ord. nov. OBUT p. 149 for Chaunograptidae BULMAN 1955, Estonia, Ordovician and Silurian.

Order Dendroidea

Dendrograptidae

Aepidograptus cf. *implicatus*, A. cf. *minor* Tremadoc, Argentina TURNER.

Callograptus cf. salteri first record from S. America, Tremadoc, Argentina TURNER; *C.?* *taizhoensis* sp. nov. Taizho Valley, Liaotung, N.E. China, Cambro-Ordovician MU (1) p. 34 pl. 1 fig. 4; *C.?* *gentaiensis* sp. nov. Taizho Valley, Liaotung, N.E. China, Cambro-Ordovician MU (1) p. 34.

Dendrograptus sp. fig'd Tvären, Sweden, Ordovician STRACHAN (3); *D. odontocauloides* sp. nov. Taizho Valley, Liaotung, N.E. China, Cambro-Ordovician MU (1) p. 35 pl. 1 fig. 3; *D. ptilograptoides* sp. nov. Taizho Valley, Liaotung, N.E. China, Cambro-Ordovician MU (1) p. 35 pl. 1 fig. 6.

Desmograptus microneumatodes quebecensis, BERRY (1).

Dictyonema, KOZŁOWSKI; *D. bohemia* Silurian, Dvůr, Bohemia FLÜGEL; *D. canadense*, KOZŁOWSKI; *D. dumosus* sp. nov. Ordovician W. Texas BERRY (3) p. 45 pl. 7 fig. 10; *D. flabelliforme*, KOZŁOWSKI; *D. flabelliforme famatinense* var. nov. Lower Tremadocian, La Rioja, Argentina TURNER p. 36 pl. 1 fig. 2; *D. f. liaotungense* var. nov. Taizho Valley, Liaotung N.E. China Cambro-Ordovician MU (1) p. 34 pl. 1 fig. 1; *D. longilingue*, KOZŁOWSKI; *D. yacouense* sp. nov. Arenigian Ordovician, Yacones and Salta, Argentine TURNER p. 46 pl. 1 fig. 1.

Anisograptidae

Adelograptus hunnebergensis Ordovician, W. Texas BERRY (3).

Anisograptus dissolutus sp. nov. Ordovician, W. Texas BERRY (3) p. 45 pl. 4 figs. 5, 6; *A. cf. flexuosus* Tremadoc, Argentina, fig'd TURNER; *A. lusi* sp. nov. Taizho Valley, Liaotung, N.E. China, Cambro-Ordovician MU (1) p. 35 pl. 1 fig. 5; *A. cf. richardsoni* Tremadoc, Argentina, fig'd TURNER.

Bryograptus crassus Ordovician, W. Texas, fig'd BERRY (3).

Calyxendrium gen. nov. mid-Ordovician, Poland KOZŁOWSKI pp. 107-125 type *C. graptoloides*; *C. graptoloides* sp. nov. mid-Ordovician, Poland KOZŁOWSKI pp. 107-125 figs. 1-11, genotype.

Clonograptus flexilis, *C. persistens*, *C. rigidus*, *C. cf. tenellus* Ordovician, W. Texas, fig'd BERRY (3); *C. tenellus callavei* var. nov. Tremadoc Silurian, S.W. of Ghardaia, Sahara LEGRAND p. 242 text-fig. 1.

Triograptus cf. otagoensis Ordovician, Texas BERRY (3).

Acanthograptidae

Acanthograptus sp., KOZŁOWSKI; *A. jubatus* type of *Boučekocaulis* gen. nov. q.v. Inocaulidae OBUT; *A. suecicus* fig'd, Ordovician, Tvären, Sweden STRACHAN (3).

Dyadograptus gen. nov. OBUT p. 147 genotype *D. praecursor*; *D. praecursor* sp. nov. Ordovician and Silurian, Estonia OBUT p. 147 pl. 1 figs. 2-2b.

Inocaulidae

Boučekocaulis gen. nov. OBUT p. 148 genotype *Acanthograptus jubatus* Estonia, Ordovician and Ludlovian.

Crinocaulis gen. nov. OBUT p. 148 genotype *C. flosculus*; *C. flosculus* sp. nov. Silurian and Ordovician, Estonia OBUT p. 148 pl. 2 fig. 2, pl. 3 figs. 1a, b.

Thallograptus densitubularis sp. nov. Porkuni stage Ordovician and Silurian, Estonia OBUT p. 146 pl. 1 figs. 1, 1a.

Ptilograptidae

Ptilograptus plumosus fig'd Ordovician, Texas BERRY (3).

Chaunograptidae

Mastigograptus sp., KOZŁOWSKI.

Rhadinograptus gen. nov. OBUT p. 151 (spelt *Rhadinograptus* p. 157) genotype *R. jurgensonae*; *R. jurgensonae* sp. nov. Ordovician and Silurian, Estonia OBUT p. 151 pl. 4 figs. 2, 2a-b, pl. 5 fig. 1a.

Order Graptoloidea

Classification, subdivided into four suborders: Didymograptina, Corynoidina, Glossograptina nov. and Diplograptina, JAANUSSON.

Corynoidina Hopkinson & Lapworth emended, JAANUSSON.

Didymograptina Lapworth emended (nom. correct, ex Didymograptina Lapworth) = Didymograptina + Dichograptina Lapworth, = Dichograptina + Leptograptina Obut, includes Dichograptidae, Nemagraptidae, Dicanograptidae and Abrograptidae, JAANUSSON.

Diplograptina Lapworth emended (nom. correct Obut ex Diplograptina Lapworth) = Diplograptina + Monograptina Lapworth, = Diplograptina + Monograptina Obut (both excluding Glossograptina and related genera), includes Diplograptidae, Retiolitidae, Monograptidae and Dimorphograptidae, JAANUSSON.

Glossograptina subord. nov. JAANUSSON p. 319, includes Glossograptidae (=Cryptograptidae).

Heterograptus proposed name for forms which are bigeneric with regard to their two borders, SAMPELAYO pp. 30, 77.

Dichograptidae (=Didymograptidae)

Didymograptidae of Llanvirnian, Spain, Sierra de Albarracín PHILIPOTT & RIBA.

Azygograptus incurvus genotype of *Pseudozygograptus* gen. nov. q.v. MU, LEE & GEH.

Cardiograptus crawfordi, *C. morsus* fig'd, Ordovician, Texas BERRY (3).

Dichograptus marathonsensis sp. nov. Ordovician, Texas BERRY (3); *D. octobrachiata* fig'd, Ordovician, Texas BERRY (3), fig'd, Arenigian, Columbia TURNER; *D. separatus* fig'd, Arenigian, Argentina TURNER.

Didymograptus spp. Ordovician, Argentina, Peru and Colombia TURNER; *D. sp. A*, *D.?* sp. B, *D.?* sp. C, *D. acutus* fig'd, *D. cf. artus* fig'd, Ordovician, Baltic JAANUSSON; *D. artus* Ordovician, Texas BERRY (3); *D. bifidus* fig'd, Ordovician, Texas BERRY (3), defines lower limit of Viruan Series, JAANUSSON; *D. cf. bifidus* fig'd, Silurian, Portugal THADEAU; *D. clavulus*, JAANUSSON; *D. deflexus scanicus* subsp. nov. Arenigian, Flajabro (Sweden—S.E. Skåne) TJERNIK p. 215 text-fig. 3; *D. denticulatus* sp. nov. Ordovician, Texas BERRY (3) p. 60 pl. 10 fig. 12; *D.?* cf. *dubitus* fig'd, Ordovician, Estonia JAANUSSON; *D. extensus* fig'd, Ordovician, Texas BERRY (3), Skiddaw beds,

Atlas Mts., Morocco DRESNAY & WILLEFORT, Baltic JAANUSSON; *D. geminus*, *D. hirundo*, JAANUSSON; *D. mendicus* fig'd, Ordovician, Texas BERRY (3); *D. muchisoni* fig'd, Ordovician, Bulgaria SPASSOW, defines upper limit of Ölandian JAANUSSON; *D. cf. muchisoni muchisoni* fig'd, Ölandian Ordovician, Sweden JAANUSSON; *D. nanus* fig'd, Ordovician, Portugal ROMARIZ (2); *D. nitidus*, *D. nodosus* fig'd, Ordovician, Texas BERRY (3); *D. novus* sp. nov. Ordovician, Texas BERRY (3) p. 62 pl. 5 figs. 6, 7; *D. pacificus* fig'd, Ordovician, Texas BERRY (3); *D. pakrianus* sp. nov. Valaestean Ordovician, Isle of Vaikre Pakri, Estonia JAANUSSON p. 310 pl. 1 figs. 1-8, pl. 3 figs. 1-5 text-fig. 4; *D. paraindentus* sp. nov. Ordovician, Marathon, W. Texas BERRY (3) p. 63 pl. 11 figs. 1, 2; *D. patulus* fig'd, Ordovician, Texas BERRY (3); *D. perneri* fig'd, Ordovician, Bulgaria SPASSOW; *D. protobifidus* fig'd, Ordovician, Texas BERRY (3); *D. v-deflexus* fig'd, Ordovician, Texas BERRY (3).

Dinemagraptus workae, KOZŁOWSKI.

Goniograptus cernuus sp. nov. Furundal limestone, Ordovician, Sweden JAANUSSON pp. 324-325 text-fig. 6A pl. 3, fig. 9; *G. teretiusculus* Ordovician, Baltic JAANUSSON; *G. thureani* fig'd, Ordovician, Texas BERRY (3); *G. vikarbyensis* sp. nov. Furundal limestone, Ordovician, Sweden JAANUSSON p. 323 text-fig. 6B pl. 3 figs. 6-8.

Holograptus deani Skiddaw beds, Atlas Mts. Morocco DRESNAY & WILLEFORT.

Isoagraptus spp. fig'd, Ordovician, Argentina TURNER; *I. caduceus divergens*, *I. c. mazima*, *I. c. mazimo-divergens*, *I. c. victoricae*, *I. forcipiformis latus* fig'd, Ordovician, Texas BERRY (3); *I. gibberulus* fig'd, Ordovician, Wolungstag Sinkiang, China MU, LEE & GEH; *I. manubriatus* fig'd, Ordovician, Texas BERRY (3).

Loganograptus logani boliviensis fig'd, Llanvirnian, Peru TURNER; *L. l. mut. pertenuis* fig'd, Ordovician, Texas BERRY (3).

Oncograptus upsilon fig'd, Ordovician, Texas BERRY (3).

Phyllograptus spp. fig'd, Ordovician, Argentina TURNER; *P. anna*, *P. a. mut. longus* fig'd, Ordovician, Texas BERRY (3); *P. furqueti* sp. nov. Arenigian, La Rioja, Argentina TURNER p. 69 pl. 4 fig. 5; *P. ilicifolius*, *P. nobilis*, *P. typus* fig'd, Ordovician, Texas BERRY (3).

Pseudoazygograptus gen. nov. MU, LEE & GEH p. 37 pl. 1 figs. 8-11, genotype *Azygograptus incurvus* Ekstrom, Ordovician, Kabukakdebukak Sinkiang, China [family given as Azygograptidae, =Dichograptidae in classification adopted here.]

Pterograptus elegans, JAANUSSON; *P. incertus* fig'd, Ordovician, Texas BERRY (3); *P. sinicus* sp. nov. Yenchu Slate, Llanvirnian, Yenchu Anhua, Central Hunan, China MU (2).

Schizograptus quebecensis Skiddaw Beds, Atlas Mts. Morocco DRESNAY & WILLEFORT.

Tetragraptus fig'd, Ordovician, Argentina and Colombia TURNER, Mézières (France) WATERLOT; *T. acclinans*, *T. amii*, *T. approximatus*, *T. bigsbyi*, *T. decipiens*, *T. fruticosus*, *T. pendens*, *T. quadribrachiatus*, *T. serra*, *T. tarazacum* fig'd, Ordovician, Texas BERRY (3).

Corynoididae

Corynoides calicularis fig'd, Ordovician, Texas BERRY (3).

Cryptograptidae

Cryptograptus spp. fig'd, Ordovician, Peru and Argentina TURNER; *C. schaeferi*, *C. tricornis* fig'd, Ordovician, Texas BERRY (3).

Glossograptus spp. fig'd, Ordovician, Argentina and Peru TURNER; *G. (Tecaanthus)* [? subgen. nov. ?] SAMPELAYO p. 35; *G. hincksi* fig'd, Ordovician Texas BERRY (3), fig'd, Ordovician, Sweden JAANUSSON; *G. (Tecaanthus) loxos* sp. nov. Silurian, Spain SAMPELAYO p. 36 pl. 16 figs. 15-21; *G. paucicoelatus* sp. nov. Silurian, Spain SAMPELAYO p. 35 pl. 16 figs. 8-14; *G. paucispinosus* sp. nov. Silurian, Spain SAMPELAYO p. 32 pl. 12 figs. 6-9; *G. petaliformes* sp. nov. Silurian, Spain SAMPELAYO p. 45 pl. 22 fig. 4.

Leptograptidae

Amphigraptus asiaticus sp. nov. Pingliang shale, Ordovician, Kuangchuan, Pingliang district, E. Kansu, China MU (2) p. 194 pl. 1 figs. 3, 4.

Leptograptus flaccidus trentonensis fig'd, Ordovician, Texas BERRY (3).

Nemagraptus gracilis, JAANUSSON, fig'd, Ordovician, Texas BERRY (3), fig'd, Caradocian, Argentina TURNER.

Pleurograptus linearis defines upper limit of Viruan Series, Ordovician, Sweden JAANUSSON; *P. lui* zone in Wufeng shale, Ordovician, Yangtze Valley, China MU (3).

Dicranograptidae

Dicellograptus, JAANUSSON; *D. complanatus*, *D. c. arkasensis*, *D. c. ornatus*, *D. divaricatus*, *D. d. salopiensis* fig'd, Ordovician, Texas BERRY (3); *D. d. salopiensis* Ordovician, Tyären, Sweden STRACHAN (3); *D. forhammeri flexuosus*, *D. gurleyi*, *D. intortus*, *D. moftatensis alabamensis*, *D. sextans exilis* fig'd, Ordovician, Texas BERRY (3); *D. cf. sextans exilis* fig'd, Ordovician, Kabukakdebukak, Sinkiang, China MU, LEE & GEH; *D. smithi* fig'd, Ordovician, Texas BERRY (3); *D. szechuanensis* sp. nov. Wufeng shale, Ordovician, Yangtze Valley, China MU (3) p. 158 pl. 1 figs. 3-6.

Dicranograptus regarded as a morphological intermediate not directly related to diplograptid evolution, BULMAN; *D. spp.* fig'd, Caradocian, Argentina TURNER; *D. brevicaulis* fig'd, Ordovician, Texas BERRY (3); *D. clingani* defines lower limit of Harjuan Series of Ordovician, Sweden JAANUSSON; *D. nicholsoni*, *D. n. geniculatus* fig'd, Ordovician, Texas BERRY (3).

Diplograptidae

Amplexograptus, JAANUSSON; *A. spp.* fig'd, Argentina TURNER; *A. confertus* fig'd, Ordovician, Texas BERRY (3); *A. c. guandacolensis* var. nov. Upper Arenigian and Lower Llanvirnian, La Rioja, Argentina TURNER p. 109 pl. 4, fig. 1, pl. 6 fig. 3; *A. cf. maxwelli* fig'd, Ordovician, Supashihkow, China MU, LEE & GEH; *A. cf. perezcavatus* fig'd, Ordovician, Texas BERRY (3).

Climacograptus spp. fig'd, Ordovician, Argentina and Peru TURNER; *C. affinis* fig'd, Silurian, Spain SUÑER COMA; *C. ancylus* sp. nov. Silurian, Spain

SAMPelayo p. 33 pl. 14 fig. 19; *C. bekkeri* fig'd, Ordovician, Sweden STRACHAN (3); *C. bicornis* fig'd, Ordovician, Texas BERRY (3); *C. brevis mutabilis* var. **nov.** Ordovician, Tvären, Sweden STRACHAN (3) p. 54 pl. 1 figs. 6-10, pl. 2 figs. 2-4 text-figs. 4-8, 9A; *C. caudatus* fig'd, Ordovician, Texas BERRY (3); *C. diplacanthus* fig'd, Ordovician, Imungangen Tawushan, W. Keping, Sinkiang, China MU, LEE & GEH; *C. distichus* fig'd, Ordovician, Estonia JAANUSON; *C. haddingi*, JAANUSON; *C. hastatus* fig'd, Ordovician, Texas BERRY (3); *C. innotatus* Llando-verian, Sahara BARLIER et al.; *C. kuckersianus* fig'd, Ordovician, Estonia JAANUSON; *C. lybicus* Llando-verian, Sahara BARLIER et al.; *C. medius* fig'd, Silurian, Spain SUÑER COMA; *C. minimus*, *C. mississippiensis* fig'd, Ordovician, Texas BERRY (3); *C. orthoceratophylus* considered junior subjective synonym of *C. distichus* Ordovician, Estonia JAANUSON; *C. parvus* fig'd, Ordovician, Texas BERRY (3); *C. pauperatus* fig'd, Ordovician, Sweden, *C. putillus*, JAANUSON; *C. rectangularis* Llando-verian, Sahara BARLIER et al., Silurian, Spain SUÑER COMA; *C. riddellensis* fig'd, Ordovician, Texas BERRY (3); *C. scalaris normalis* Llando-verian, Sahara BARLIER et al.; *C. scharenbergi* genotype of *Pseudoclimacograptus*, JAANUSON; *C. s. cf. stenostoma* fig'd, Ordovician, Texas BERRY (3); *C. setiles* sp. **nov.** Silurian, Spain SAMPelayo p. 61 pl. 30 fig. 6; *C. tubuliferus*, *C. typicalis crassimarginalis* fig'd, Ordovician, Texas BERRY (3); *C. cf. uniformis* fig'd, Ordovician, Kalataikshan, W. Keping, Sinkiang, China, MU, LEE & GEH.

Diplograptus spp. fig'd, Ordovician and Silurian, Argentina and Paraguay TURNER; *D. (Petalograptus)* sp. fig'd, Silurian, Portugal THADEAU; *D. (Orthograptus)* cf. *bellulus* fig'd, Llando-verian, Pyrenees CAVET; *D. crassitestus* fig'd, Ordovician, Texas BERRY (3); *D. leptotheca*, *D. (=Gymnograptus) linnarsoni* [sic.], JAANUSON; *D. minutus* sp. **nov.** Ordovician, Marathon, W. Texas BERRY (3) p. 85 pl. 18 figs. 2, 3; *D. multidentis*, JAANUSON, fig'd, Ordovician, Texas BERRY (3).

Glyptograptus spp. fig'd, Ordovician, Argentina and Peru TURNER; *G. cf. austrodentatus* fig'd, Ordovician, Texas BERRY (3); *G. cernus* sp. **nov.** Furundal limestone, Ordovician, Siljan district of Fjåcka, Baltic JAANUSON p. 324 pl. 3 fig. 9 text-fig. 6A; *Glyptograptus* [err. pro *Glyptograptus*] *ceras* sp. **nov.** Silurian, Spain SAMPelayo p. 38 pl. 17; *G. dentatus* fig'd, Ordovician, Bulgaria SPASSOW; *G. euglyphus* fig'd, Ordovician, Portugal ROMARIZ (2); *G. grossitheatus* fig'd, Silurian, Spain SAMPelayo; *G. serratus* fig'd, Ordovician, Portugal ROMARIZ (2); *G. tamariscus* fig'd, Silurian, Bulgaria SPASSOW; *G. teretiusculus*, *G. t. euglyphus* fig'd, Ordovician, Texas BERRY (3); *G. cf. teretiusculus*, KOZLOWSKI, fig'd, Ordovician, Sweden JAANUSON; *G. vikarbyensis* sp. **nov.** Furundal limestone, Ordovician, Siljan district, Vikarby, Fjåcka, Sweden JAANUSON.

Glyptograptus ceras sp. **nov.** see *Glyptograptus ceras* sp. **nov.**

Gymnograptus linnarsoni fig'd, Ordovician, Sweden JAANUSON; *G. retioloides*, KOZLOWSKI.

Orthograptus see also *Diplograptus*; *O.* spp. fig'd, Bolivia and Argentina TURNER; *O. cf. apiculatus* fig'd, Ordovician, Supashihkow, China MU, LEE & GEH; *O. bellulus* see *Diplograptus*; *O. calcaratus*, *O. c. acutus*, *O. cf. c. basilicus*, *O. c. incius*, *O. cf. c.*

vulgatus fig'd, Ordovician, Texas BERRY (3); *O. inopinatus* fig'd, Silurian, Bulgaria SPASSOW; *O. quadrimucronatus*, *O. q. angustus*, *O. truncatus abbreviatus*, *O. t. intermedius*, *O. t. recurrens*, *O. t. socialis* fig'd, Ordovician, Texas BERRY (3); *O. uplandicus* fig'd, Ordovician, Tvären, Sweden STRACHAN (3); *O. vesiculatus* fig'd, Silurian, Bulgaria SPASSOW; *O. whitfieldi* fig'd, Ordovician, Texas BERRY (3).

Petalograptus see also *Diplograptus*; *P.* sp. Silurian, Portugal THADEAU; *P. latus-spirifer* sp. **nov.** Silurian, Spain SAMPelayo p. 26 pl. 9 fig. d; *P. palmatus*, *P. p. ovato-elongatus* fig'd, Silurian, Spain SUÑER COMA; *P. tenuis-spirifer* fig'd, Silurian, Spain SAMPelayo.

Pseudoclimacograptus redefined, genotype *Climacograptus scharenbergi*, JAANUSON; *P. angulatus scybiensis* subsp. **nov.** Ölandian limestone, Ordovician, Öland, Sweden JAANUSON p. 330 pl. 4 figs. 5-9 text-fig. 7D; *P. eurystoma* sp. **nov.** Folkeslunda limestone, Ordovician, Öland, Sweden JAANUSON p. 327 pl. 4 fig. 10 text-fig. 7A; *P. luperus* sp. **nov.** Folkeslunda limestone, Ordovician, Öland, Sweden JAANUSON p. 329 pl. 4 figs. 1-4 text-fig. 7C; *P. scharenbergi*, *P. cf. scharenbergi* fig'd, Ordovician, Estonia JAANUSON; *P. s. minor* var. **nov.** Ordovician, Supashihkow, Keping, Sinkiang, China MU, LEE & GEH p. 38 pl. 3 figs. 1-4.

Trigonograptus ensiformis fig'd, Ordovician, Texas BERRY (3), fig'd, Ordovician, Wolungtag Sinkiang, China MU, LEE & GEH; *T. garecai* sp. **nov.** Llando-verian Ordovician, Huaco River, San Juan, Argentina TURNER p. 118 pl. 7 fig. 5, pl. 8 fig. 9.

Lasiograptidae

Halograptus etheridgei fig'd, Ordovician, Texas BERRY (3); *H. hystrix*, JAANUSON; *H. mucronatus* fig'd, Ordovician, Texas BERRY (3).

Lasiograptus redefined (= *Thysanograptus* Elles & Wood obj.) type species *Lasiograptus costatus*, JAANUSON; *L. haplus* sp. **nov.** Folkeslunda limestone, Ordovician, Öland Gårdlösa, Sweden JAANUSON p. 336 pl. 5 figs. 6-7 text-fig. 8.

Retiolitidae

Archiretiolites, SKEVINGTON.

Orthoretiolites hami, SKEVINGTON; *O. h. robustus* var. **nov.** Ordovician, Ardmore Criner Hills, Oklahoma SKEVINGTON p. 226 pls. 34, 35 text-figs. 1-4.

Paraplectograptus, SKEVINGTON.

Plectograptus sp., BERRY (1).

Plegmatograptus, SKEVINGTON.

Pseudoplegmatograptus oboeus cf. var. *hexagonalis* Silurian Inlier, Carmichael, Lanarkshire ROLFE.

Retiograptus, SKEVINGTON; *R. geinitzianus*, *R. pulcherrimus* fig'd, Ordovician, Texas BERRY (3).

Retiolites, SKEVINGTON.

Spirograptus considered a subgenus of *Mono-graptus*, MU (4); *S. proteus* fig'd, Silurian, Gotland FLÜGEL; *S. turriculatus* fig'd, Silurian, Spain SUÑER COMA.

Dimorphograptidae

Dimorphograptus regarded as a morphological intermediate not directly related to monograptid evolution, BULMAN.

Monograptidae

Classification, MU (4); astrogenetic succession of thecae fig'd, URBANEK (2).

Cucullograptus gen. nov. Monograptidae Ludlovian Silurian, Poland, genotype *C. pazdroi* sp. nov. URBANEK (1) p. 291; *C. aversus rostratus* subsp. nov. Silurian erratic boulders of Scandinavian origin from Jarosławiec and Ustka, W. Pomerania URBANEK (2) p. 216 pl. 3 figs. 1-5 text-figs. 13G, 14D, 21; *C. hemiaversus* sp. nov. Silurian erratic block of Scandinavian origin at Rowal, W. Pomerania URBANEK (2) p. 215 pl. 2 figs. 2a-b text-figs. 2A, 6, 13E, 14C; *C. pazdroi* sp. nov. erratic boulder from Wrzeszcz near Gdansk, Ludlovian Silurian, Poland URBANEK (1) p. 292 text-figs. 1-8.

Cyrtograptus lundgreni, *C. perneri*, *C. rigidus*, BERRY (1).

Demirastrites (*Obutograptus*) subgen. nov. type *Graptolithus spiralis* Geinetz, MU (4) p. 10; *D. communis* fig. 16, *D. c. rostratus* fig. 16, *D. decipiens* fig. 13, *D. fimbriatus* fig. 17, *D. raitzhainiensis* fig. 14, *D. triangulatus major* fig. 12, Spain, Silurian, SUÑER COMA.

Diversograptus note on structure and possible evolution, = alternate sexual generation of *Lino-graptus* and hence junior subjective synonym of *Lino-graptus*, JAEGER.

Graptolithus spiralis subgenotype of *Obutograptus* subgen. nov., MU (4); *G. turriculatus* subgenotype of *Spirograptus*, MU (4).

Lino-graptus = alternate generation of *Diversograptus* and hence includes *Diversograptus*, JAEGER.

Lobograptus exspectatus sp. nov. Silurian erratic boulder of Scandinavian origin at Ustka, W. Pomerania URBANEK (2) p. 213 pl. 2 figs. 1a-b, 3, 4 text-figs. 13B, 14B; *L. simplex* sp. nov. Silurian erratic boulder of Scandinavian origin at Lubin, Wolin Is. W. Pomerania URBANEK (2) p. 211 pl. 1 figs. 1a-c text-figs. 13A, 14A, 19, 20.

Mesograptus climaco-glyptus Silurian, Spain SAMPelayo; *M. vertebralis* sp. nov. Silurian, Spain SAMPelayo pp. 54, 56 pl. 28 fig. 20 (given as *Monograptus vertebralis* on pl.).

Monoclimacis = *Monograptus*, BERRY (1).

Monograptus spp. from Silurian Inlier, Carmichael, Lanarkshire, Scotland ROLFE; *M. (Spirograptus)* Gürich emend., subgenotype *Graptolithus turriculatus* Barrande, MU (4); *M. almadeni inversa* sp. et var. nov. Silurian, Spain SAMPelayo p. 48 pl. 24 fig. 5; *M. ancylus* sp. nov. Silurian, Spain SAMPelayo p. 22 pl. 8 fig. 49; *M. aversus* fig'd, Silurian, Jarosławiec, Poland URBANEK (1); *M. becki* fig'd, Silurian, Horrem near Köln, Germany HUNDT; *M. chimaera*, photos, Silurian, Rügen Is. FLÜGEL; *M. cf. circularis lineatus* var. nov. Silurian, Spain SAMPelayo p. 48 pl. 24 fig. 10; *M. colonus* Ludlovian, Maine BERRY (1); *M. communis-ancylus* Silurian, Spain SAMPelayo; *M. communis-hidrarigi*

sp. nov. Silurian, Spain SAMPelayo p. 22 pl. 5 fig. 46, pl. 7 figs. 46, 46b, pl. 8 fig. 46a; *M. communis-hispanus* sp. nov. Silurian, Spain SAMPelayo p. 13 pl. 7 figs. 45, 45a-f, i, k-m; *M. corona* sp. nov. Silurian, Spain SAMPelayo p. 72 pl. 6 figs. 42, 42a; *M. cyphus* Llandoveryan, Sahara BARLIER et al.; *M. dubius* Silurian, Rügen Is. FLÜGEL, Silurian, Maine BERRY (1); *M. d. latus*, BERRY (1); *M. fimbriatus distans* var. nov. Silurian, Spain SAMPelayo p. 59 pl. 29 fig. 10; *M. f. minimo* var. nov. Silurian, Spain SAMPelayo p. 26 pl. 11 fig. c (? error pro *M. f. minima*—see p. 59 pl. 29 fig. 6); *M. flemingi* Wenlockian, Pyrenees CAVET; *M. forbesi* sp. nov. Ludlovian, Maine BERRY (1) p. 1162 text-figs. 2B, 2G; *M. habermeleri* sp. nov. Silurian, Spain SAMPelayo p. 12 pl. 7 figs. 45e, g, m; *M. halli* Silurian, Spain SUÑER COMA; *M. hemiodon*, *M. hercynicus* Silurian, Poland TELLER; *M. hidrarigi* sp. nov. Silurian, Spain SAMPelayo pp. 23, 48 pl. 8 figs. 51, 51a; *M. hidrarigi-rostellum* sp. nov. Silurian, Spain SAMPelayo p. 22 pl. 8 figs. 52b, 53b, c; *M. hidrarigi-rostratus* sp. nov. Silurian, Spain SAMPelayo p. 22 pl. 8 figs. 52, 52a, 52c; *M. hispanus-communis*, *M. hispanus-rostratus* Silurian, Spain SAMPelayo; *M. incommodus* Llandoveryan, Sahara BARLIER et al.; *M. intermedius-hidrarigi*, *M. t. truncatus* Silurian, Spain SAMPelayo; *M. lacunosus* Silurian, Horrem near Köln, Germany, fig'd HUNDT; *M. leituwardinensis* Aymestry limestone, Silurian, Britain LAWSON; *M. lobiferus-altus* var. nov. Silurian, Spain SAMPelayo pl. 4 figs. 32, 32b; *M. lobiferus-distans* var. nov. Silurian, Spain SAMPelayo p. 21 pl. 5 figs. 33, 33a, b; *M. lobiferus-rostellum* var. nov. Silurian, Spain SAMPelayo p. 21 pl. 5 figs. 34, 34a; *M. mac-coyi* Silurian, Spain SUÑER COMA; *M. cf. marri distans* var. nov. Silurian, Spain SAMPelayo p. 68 pl. 33 fig. 18; *M. meneghini*, BERRY (1); *M. nicholsoni* Silurian, Spain SUÑER COMA; *M. nilsoni*, *M. praedubius* Lower Ludlovian, U.S.A. BERRY (1); *M. priodon* Wenlockian, Pyrenees CAVET; *M. priodon-rostellum* var. nov. Silurian, Spain SAMPelayo pl. 3 fig. 20; *M. priodon validus* Silurian, Gotland FLÜGEL; *M. rostellus* sp. nov. Silurian, Spain SAMPelayo p. 19 pl. 3 fig. 18; *M. rostratus* sp. nov. Silurian, Spain SAMPelayo p. 17, 22 pl. 8 fig. 48; *M. rostratus-ancylus* sp. nov. Silurian, Spain SAMPelayo p. 22 pl. 8 figs. 50, 50a-c; *M. riccartonensis*, BERRY (1); *M. scanicus*, BERRY (1), Lower Ludlovian JAEGER, Silurian, Łobez, Poland URBANEK (1); *M. sedgwicki* Silurian, Spain SUÑER COMA, Ordovician, Portugal ROMARIZ (2); *M. cf. sedgwicki* Silurian, Portugal THADEAU; *M. (Streptograptus) spericus* Silurian, Gotland FLÜGEL; *M. exspectatus*, *M. tumescens*, BERRY (1); *M. t. contus* var. nov. Ludlovian, Ashland, Maine, U.S.A. BERRY (1) p. 1162 text-fig. 2C; *M. vertebralis* sp. nov. see *Monograptus vertebralis*; *M. vulgaris*, BERRY (1); *M. v. ashlandensis* var. nov. Ludlovian, Ashland, Maine, U.S.A. BERRY (1) p. 1163 text-fig. 2H; *M. aff. vomerinus* Wenlockian, Argentina TURNER.

Obutograptus subgen. nov. of *Demirastrites* q.v. MU (4) p. 10.

Priostigraptus = *Monograptus*, BERRY (1); *P. (Colonograptus) colonus* Silurian, Łobez, Poland, P. (P.) nilsoni Silurian, Jarosławiec, Poland URBANEK (1); *P. regularis regularis* Ordovician, Portugal ROMARIZ (2); *P. spectatus* see *Monograptus spectatus*.

Rastrites equidistans, *R. linnaei* Silurian, Spain SUÑER COMA; *R. linnei* Silurian, Zerkowice, Bohemia

FLÜGEL; *R. longispinus*, *R. peregrinus*, *R. setiger* Silurian, Spain SUÑER COMA.

Spirograptus see Retiolitidae.

Streptograptus lobiferus Silurian, Spain SUÑER COMA.

Class ENTEROPNEUSTA

Compared with Pogonophora, AX, IVANOV (1, 3).

Harrimanidae

Dolichoglossus see *Saccoglossus*.

Protoglossus koehleri, BURDON-JONES & PATIL.

Saccoglossus revised, BURDON-JONES & PATIL, gut and feeding, MORTON; *S. cambrensis*, IVANOV (3), = *S. ruber*, BURDON-JONES & PATIL; *S. horati*, BURDON-JONES & PATIL, gut and feeding, MORTON; *S. kowalevskyi*, BURDON-JONES & PATIL, compared with Pogonophora [as *Dolichoglossus*] IVANOV (3), from Massachusetts [as *Dolichoglossus*] SANDERS; *S. mereschkowskii* Adriatic and Arctic, RIEDL; *S. pusillus* [as *Dolichoglossus*] embryo compared with Pogonophora, IVANOV (1, 3), AX; *S. pygmaeus*, BURDON-JONES & PATIL; *S. ruber*, includes *S. cambrensis* and *S. serpentinus* as junior subjective synonyms, BURDON-JONES & PATIL; *S. serpentinus* = *S. ruber*, BURDON-JONES & PATIL.

Stereobalanus fig'd, first record from Old World. BURDON-JONES & McINTYRE; *S. sp.* fig'd, BURDON-JONES & PATIL; *S. canadensis*, *S. willeyi*, BURDON-JONES & McINTYRE.

Ptychoderidae

Balanoglossus, IVANOV (3); *B. canadensis* see *Stereobalanus*; *B. mereschkowskii*, IVANOV (3).

Glossobalanus, NICOL (1), gut and feeding, MORTON; *G. marginatus*, BURDON-JONES & PATIL; *G. minutus*, gut and feeding, MORTON; *G. sarniensis*, BURDON-JONES & PATIL.

PHYLUM CHORDATA

Origin.—BONE (1).

SUBPHYLUM TUNICATA

Phylogeny.—BONE (1).

Class ASCIDIACEA

Clavelinidae

Archiascidia neapolitana ecology, PARENZAN (1).

Atapozoa marshi New Zealand, MILLAR (3).

Clavelina feeding, MORTON; *C. claviformis* New Zealand, MILLAR (3); *C. dellavallei* ecology, PÉRES (3).

Distaplia arnbacki sp. nov. Antarctic MILLAR (3) pp. 144-147 fig. 6 pls. IV, VI; *D. bermudensis*, PÉRES (1); *D. brevinae* sp. nov. New Zealand MILLAR (3) pp. 143-144 fig. 65; *D. colligans* Antarctic MILLAR (3); *D. coronata*, moulting at metamorphosis, OKA; *D. cylindrica*, *D. kerguelensis* Antarctic MILLAR (3); *D. knozi* New Zealand BREWIN; *D. magnilarva* [as *Holozoa*] ecology, PARENZAN (1); *D. taylora*, BREWIN.

Holozoa magnilarva see *Distaplia*.

Podoclavella australis diagnosis, *P. cylindrica* Australia, *P. detorta* diagnosis, MILLAR (3); *P. kotae* sp. nov. New Zealand MILLAR (3) pp. 65-68 fig. 16 pl. 11.

Sycozoa anomala sp. nov. New Zealand MILLAR (3) pp. 75-77 fig. 20 pl. 111; *S. georgiana* Antarctic, *S. kanzasi* diagnosis, MILLAR (3); *S. sigillinoides*, BREWIN; *S. sigillinoides* Brewin non = *S. sigillinoides* Lesson, Antarctic MILLAR (3).

Polycitoridae

Archidistoma aggregatum Japan NAKAUCHI.

Cystodytes antarctica = *C. dellechiaiei* forma antarctica MILLAR (3); *C. dellachiaiae* [sic.] New Zealand BREWIN; *C. dellechiaiei* New Zealand MILLAR (3), ecology, PÉRES (3); *C. d. forma antarctica* nom. nov. Antarctic MILLAR (3).

Eudistoma, PÉRES (1); *E. spp.*, ecology, PÉRES (3); *E. circumvallatum* New Zealand BREWIN; *E. costai*, PÉRES (1); *E. mucosa*, *E. rubra*, ecology, COSTA.

Hypsistozoa fassmeriana, BREWIN, SUTTON, New Zealand MILLAR (3).

Paradistoma see *Polycitor*.

Polycitor spp. [as *Paradistoma*] ecology, PÉRES (3); *P. circumvallatum* New Zealand BREWIN; *P. costai* ecology, COGNETTI & SANTARELLI; *P. cristallinum* (as *Paradistoma*) ecology, COSTA, PÉRES (1); *P. mutabilis*, NAKAUCHI.

Polyelinidae

Amaroecium see *Amaroucium*.

Amaroucium see also *Aplidium*; *A. sp.* PÉRES (1), metamorphosis, LYNCH (2); *A. areolatum* ecology, COSTA, PÉRES (3); *A. benhami* New Zealand BREWIN; *A. conicum* ecology, PARENZAN (1); *A. constellatum* metamorphosis, LYNCH (1), ecology and abundance, SCHWARTZ et al.; *A. foliaceum* New Zealand BREWIN; *A. lobatum* ecology, PÉRES (3); *A. pellucidum*, SCHWARTZ et al.; *A. phortax* fouling in New Zealand, SKERMAN; *A. p. forma typica* New Zealand BREWIN; *A. proliferum* ecology, PÉRES (3); *A. stellatum*, SCHWARTZ et al.; *A. stelliferum*, *A. thomasi*, *A. thomsoni* New Zealand BREWIN; *A. turbinatum* ecology, COSTA.

Aplidiopsis discoveryi sp. nov. New Zealand MILLAR (3) p. 51 fig. 8; *A. pannosum* Kamchatka TOKIOKA (1).

Aplidium see also *Amaroucium*; *A. aspersum* ecology, KERNEIS; *A. caeruleum*, *A. circumvallatum* Antarctic MILLAR (3); *A. falklandicum* sp. nov. Falkland Is. MILLAR (3) pp. 34-36 fig. 3 pl. I; *A. fuesense* Antarctic MILLAR (3); *A. cf. griseum* ecology, COSTA; *A. oamaruensis*, *A. notti*, *A. novae-zealandicae*, *A. phortax* diagnoses, MILLAR (3); *A. (Amaroucium) phortax* fouling in New Zealand, SKERMAN; *A. quadrilobatum* sp. nov. New Zealand MILLAR (3) pp. 43-44 fig. 6; *A. radiatum* Antarctic, *A. scabellum* diagnosis, MILLAR (3); *A. seeligeri* sp. nov. New Zealand MILLAR (3) pp. 44-45 fig. 4; *A. stanleyi* sp. nov. Falkland Is. MILLAR (3) pp. 41-43 fig. 6; *A. thomsoni* diagnosis, *A. variabile* Antarctic MILLAR (3).

Macroclinum, *M. lacazei*, PÉREZ (1).

Morchellium argus feeding, MORTON.

Polychinella azemai ecology, COSTA.

Protopolyclinum gen. nov. MILLAR (3) p. 52, type sp. *P. pedunculatum*; *P. pedunculatum* sp. nov. New Zealand MILLAR (3) pp. 52-54.

Pseudodistoma cyrnusense ecology, PICARD, PÉREZ (1, 3).

Ritterella arenosa, *R. aurea*, *R. novae-zealandicae*, *R. opaca* diagnoses, *R. vestita* sp. nov. New Zealand MILLAR (3) pp. 54-56 fig. 10.

Sidneioides ivicence [sic.], PÉREZ (1).

Sigillinaria = *Ritterella*, MILLAR (3).

Synoicum adareanum Antarctic, *S. arenaceum* diagnosis, *S. georgianum*, *A. giardi* Antarctic, *S. kuranui* New Zealand, MILLAR (3); *S. pulmonaria* Bering Sea, TOKIOKA (1); *S. tukusui* sp. nov. Japan TOKIOKA (3) pp. 207-208 pl. 24 figs. 1-4; *S. turgens* Bering Sea, TOKIOKA (1).

Didemnidae

Didemnopsis inarmata ecology, PÉREZ (3).

Didemnum albidum, BREWIN, Norway, BURDON-JONES & TAMBS-LYCHE; *D. biglans* Antarctic, MILLAR (3); *D. candidum* New Zealand, BREWIN, ecology, PÉREZ (3); *D. canum* ecology, PARENZAN (1, 2); *D. chilense* diagnosis, MILLAR (3); *D. chondrilla*, BREWIN; *D. dentatum* ecology, PÉREZ (3), [as *Leptoclinum*] PARENZAN (2); *D. fulgens* ecology, COSTA, PÉREZ (3), [as *Leptoclinum*] PARENZAN (2); *D. maculosum* ecology, COGNETTI & SANTARELLI, COSTA, PÉREZ (3), [as *Leptoclinum*] PARENZAN (2); *D. psammotodes* var. *maculatum*, BREWIN; *D. studeri* Antarctic, *D. tenue* diagnosis, MILLAR (3); *D. trivolutum* sp. nov. Falkland Is. MILLAR (3) pp. 58-60 fig. 12; *D. tuberculatum* New Zealand, BREWIN; *D. viride*, NICOL (1).

Diplosoma gelatinosum ecology, COSTA, PÉREZ (1), PARENZAN (1); *D. listerianum* [as *D. listeri*] ecology, PÉREZ (1, 4); *D. macdonaldi* New Zealand, BREWIN, fouling in New Zealand, SKERMAN, = *D. listerianum*, PÉREZ (4); *D. virens*, NICOL (1).

Leptoclinides auranticus diagnosis, *L. diemenensis* New Zealand, diagnosis, MILLAR (3); *L. faeroensis* Norway, BURDON-JONES & TAMBS-LYCHE; *L. marmoreus*, *L. sluteri* diagnoses, MILLAR (3).

Leptoclinum coccineum ecology, PARENZAN (2); *L. dentatum*, *L. fulgens*, *L. maculosum* see *Didemnum*.

Lissoclinum pseudoleptoclinum, PÉREZ (1).

Polysyncrator lacazei ecology, CARPINE, COSTA.

Trididemnum auriculatum Antarctic, MILLAR (3); *T. cyclops*, NICOL (1); *T. propinquum* diagnosis, MILLAR (3); *T. tenerum* ecology, PÉREZ (3).

Diazonidae

Diazona violacea ecology, COGNETTI & SANTARELLI, COSTA, PARENZAN (1), PÉREZ (4), vanadium, NICOL (1).

Rhopalaea neapolitana ecology, COSTA, PARENZAN (1, 2), PÉREZ (3).

Rhopalopsis hartmeyeri ecology, PÉREZ (1, 3).

Tylobrachion antarcticum, *T. speciosum*, *T. weddelli*, diagnoses, MILLAR (3).

Cionidae

Ciona, NICOL (1), thyroid hormones, COVELLI *et al.*, feeding, MORTON, test, NICOL (1); *C. intestinalis*, ENDEAN, PÉREZ (1), iodine in tunic and endostyle, no chitin in test, BARRINGTON & BARRON, development, BELL, electron microscopy of 4-cell embryo, BERG & HUMPHREY, Norway, BURDON-JONES & TAMBS-LYCHE, enzymes, CORNER *et al.*, histochemistry of egg, DALQ, electron microscopy of egg, MANCUSO, vanadium, NICOL (1), ecology, PÉREZ (4), PICARD, thyroid hormones, ROCHE *et al.*, fouling in New Zealand, SKERMAN, Japan, TOKIOKA (1).

Perophoridae

Ecteinascidia feeding, MORTON; *E. turbinata* vanadium, NICOL (1), ecology, PÉREZ (3).

Perophora sp. Japan, TOKIOKA (2); *P. orientalis* moulting at metamorphosis, OKA; *P. viridis*, OKA, vanadium, NICOL (1).

Corellidae

Corella eumyota New Zealand, BREWIN, Antarctic, MILLAR (3), fouling in New Zealand, SKERMAN; *C. japonica* var. *asamushi* Japan, TOKIOKA (1); *C. parallelogramma* Norway, BURDON-JONES & TAMBS-LYCHE.

Rhodossoma callense ecology, PARENZAN (2); *R. turcicum* Japan, TOKIOKA (2).

Asciidiidae

Ascidia feeding, MORTON, test, circulation, NICOL (1); *A. ahodori* Japan, TOKIOKA (2); *A. challengeri* diagnosis, Antarctic, MILLAR (3); *A. conchilega*, ENDEAN, vanadium, NICOL (1), Norway, BURDON-JONES & TAMBS-LYCHE; *A. dispar* diagnosis, MILLAR (3); *A. gamma* Japan, TOKIOKA (1); *A. interrupta* W. Africa, MILLAR (3); *A. malaca*, DALQ; *A. mentula*, ENDEAN, BRESICIANI & LÜTZEN, Norway, BURDON-JONES & TAMBS-LYCHE, ecology, COGNETTI & SANTARELLI, COSTA, KERNEIS, PARENZAN (1, 2), PÉREZ (3), vanadium, NICOL (1), size, PARENZAN (2); *A. m. forma rubra*, *A. muricata* ecology, PARENZAN (1); *A. nigra* vanadium, NICOL (1); *A. obliqua* Norway, BURDON-JONES & TAMBS-LYCHE; *A. plicata* ? = *A. translucida*, MILLAR (3); *A. prunum*, Norway, BURDON-JONES & TAMBS-LYCHE; *A. samae* vanadium, NICOL (1); *A. sydneiensis* S. Africa, Australia, MILLAR (3); *A. s. samae* Japan, TOKIOKA (1); *A. translucida* Antarctic, MILLAR (3); *A. virginea* Norway, BURDON-JONES & TAMBS-LYCHE; *A. zara* Japan, TOKIOKA (1).

Asciidiella feeding, MORTON; *A. aspersa*, DALQ, NICOL (1), parasitized, BRESICIANI & LÜTZEN, cellulose of test, HALL, embryology of C.N.S. in hybrids with *Phallusia mammillata*, MINGANTI (1), development of hybrids, MINGANTI (2); *A. pellucida* ecology, PÉREZ (3, 4); *A. scabra*, BRESICIANI & LÜTZEN, embryology, DALQ.

Phallusia feeding, MORTON; *P. fumigata* ecology, COSTA, PICARD vanadium, NICOL (1); *P. hygomiana* vanadium, NICOL (1); *P. mammillata*, DALQ, BARRINGTON & BARRON, Norway, BURDON-JONES & TAMBS-LYCHE, ecology, COSTA, PARENZAN (1), PÉREZ (3), blood cells, ENDEAN, cellulose of test, HALL, embryology of C.N.S. in hybrids with *Asciidiella aspersa*, MINGANTI (1), development of hybrids, MINGANTI (2), vanadium, NICOL (1), embryology of C.N.S., ORTOLANI, nucleolus and cytochemistry during oogenesis, RANZOLI.

Agnesiidae

Agnesia capensis diagnosis, *A. complicata* = *Caen-agnesia bocki*, *A. glaciata* New Zealand, diagnosis, *A. krausei* diagnosis, MILLAR (3).

Caenagnesia bocki Antarctic, MILLAR (3).

Botryllidae

Botrylloides leachi New Zealand, BREWIN, ecology, PARENZAN (1, 2), fouling in New Zealand, SKERMAN.

Botryllus, NICOL (1); *B. aurolineatus*, *B. a. anemone*, *B. a. lutosus*, *B. calendula* all forms of *B. schlosseri*, genetics, SABBADIN (1); *B. magnicoecus*, BREWIN; *B. meronis*, *B. morio* forms of *B. schlosseri*, genetics, SABBADIN (1); *B. primigenus* fusion of colonies, OKA & WATANABE; *B. pruinus*, *B. rubigo*, forms of *B. schlosseri*, genetics, SABBADIN (1); *B. schlosseri* ecology, KERNEIS, PARENZAN (1), PÉRÈS (1), New Zealand, BREWIN, colour forms, genetics of colour, pigments, pattern SABBADIN (1), "situe inversus viscerum", SABBADIN (2), rearing in lab., culture methods, SABBADIN (3), fouling in New Zealand, SKERMAN; *B. s. var. adonis*, *B. s. var. viridulus* colour forms of *B. schlosseri*, genetics, SABBADIN (1); *B. separatus* New Zealand, MILLAR (3); *B. smaragdus*, *B. s. hepatica*, *B. s. cyanovirens*, *B. violaceus*, *B. v. nigricans* colour forms of *B. schlosseri*, genetics, SABBADIN (1).

Distomus variolosus ecology, COSTA, PÉRÈS (3).

Polyzoa opuntia, *P. reticulata* Antarctic, MILLAR (3).

Styelidae

Alloeocarpa incrustans Subantarctic, MILLAR (3); *A. minuta*, BREWIN.

Amphicarpa diptycha Australia, MILLAR (3).

Asterocarpa cerea New Zealand, BREWIN, fouling in New Zealand, SKERMAN.

Cnemidocarpa sp. Japan, TOKIOKA (2); *C. bicornuata* New Zealand, BREWIN; *C. drygalskii* Antarctic, diagnosis, MILLAR (3); *C. fertilis* forma minor Japan, TOKIOKA (1); *C. madagascariensis* var. *regalis*, *C. nisiotis* New Zealand, BREWIN; *C. nordenskjöldi* Subantarctic, diagnosis, MILLAR (3); *C. novae-zealandiae*, BREWIN; *C. pfefferi* Antarctic, MILLAR (3); *C. tricostrata* sp. nov. S. Georgia MILLAR (3) pp. 106-109 fig. 40; *C. verrucosa* Subantarctic, MILLAR (3).

Dendrodoa aggregata Kamchatka, TOKIOKA (1); *D. grossularia* Norway, BURDON-JONES & TAMBS-LYCHE; *D. pulchella* Kamchatka, TOKIOKA (1).

Pandocia pomaria see *Polycarpa*.

Polycarpa doderleini var. *siiranki* var. nov. Japan TOKIOKA (2) pp. 209-211 pl. 26 figs. 7-10, pl. 27 figs. 11-15; *P. gracilis* ecology, PÉRÈS (3); *P. pomaria* Norway, BURDON-JONES & TAMBS-LYCHE, ecology, CARPINE, COSTA, PÉRÈS (3); *P. p. forma tuberosa* [as *Pandocia*] ecology, PARENZAN (1).

Styela, NICOL (1); *S. sp.*, PÉRÈS (1); *S. atlantica* Norway, BURDON-JONES & TAMBS-LYCHE; *S. bornharti* electron microscopy of 4-cell embryo, BERG & HUMPHREYS; *S. clava* senior subjective synonym of *S. mammiolata*, MILLAR (1), Japan,

TOKIOKA (1); *S. coriacea*, BRESCHIANI & LÜTZEN, Norway, BURDON-JONES & TAMBS-LYCHE; *S. flava*, *S. glans* diagnoses, *S. insinuosus* Antarctic, MILLAR (3); *S. macrateron* diagnosis, Bering Sea, TOKIOKA (1); *S. magalhaensis* diagnosis, Antarctic, MILLAR (3); *S. mammiolata*, spread in Britain, HOUGHTON & MILLAR, = *S. clava*, MILLAR (1); *S. melinae* diagnosis, ? = *S. magalhaensis*, *S. nordenskjöldi* = *Cnemidocarpa n.*, *S. oblonga* diagnosis, *S. paessleri* Subantarctic, MILLAR (3); *S. partita*, BERG & HUMPHREYS, ecology, COSTA, PÉRÈS (3), [as *Tethyum*] PARENZAN (1), Ascension Is., MILLAR (3), Japan, TOKIOKA (2); *S. plicata*, ecology, PÉRÈS (1, 4), fouling in New Zealand, SKERMAN, Japan, TOKIOKA (2); *S. rustica*, BRESCHIANI & LÜTZEN, Norway, BURDON-JONES & TAMBS-LYCHE; *S. schmitti* forma *simplex*, form. nov. S. America MILLAR (3) pp. 109-111 fig. 41.

Tethyum, NICOL (1); *T. partitum* see *Styela*.

Pyuridae

Bathypora splendens Antarctic, MILLAR (3).

Boltenia, NICOL (1); *B. echinata* Norway, BURDON-JONES & TAMBS-LYCHE; *B. e. forma iburi* Japan, TOKIOKA (2); *B. ovifera* Kamchatka, TOKIOKA (1); *B. transversaria* Japan, TOKIOKA (2).

Cynthia see *Halocynthia*.

Halocynthia, NICOL (1); *H. papillosa*, BARRINGTON & BARRON, ecology, CARPINE, COGNETTI & SANTARELLI, COSTA, KERNEIS, LABOREL & VACHELET, PARENZAN (1), PÉRÈS (3); *H. pinnata* N. Pacific [as *Cynthia*] TOKIOKA (4).

Herdmania momus Australia, MILLAR (3).

Microcosmus kura fouling in New Zealand, SKERMAN; *M. multitenaculatus* Japan, TOKIOKA (2); *M. sulcatus* ecology, CARPINE, COSTA, LABOREL & VACHELET, PARENZAN (1), PÉRÈS (3); *M. s. polymorphus* ecology, KERNEIS, edibility, MARAGLINO & STEFANO; *M. vulgaris* ecology, PARENZAN (1).

Pyura feeding, MORTON, test, NICOL (1); *P. sp.* RNA in oocytes, SESHACHAR & RAO; *P. bouvetensis* diagnosis, Antarctic, MILLAR (3); *P. cancellata* New Zealand, *P. carnea*, BREWIN; *P. discoveryi* Antarctic, *P. echinops* diagnosis, *P. georgiana* diagnosis, Antarctic, *P. jacaensis* Indian Ocean, *P. legumen* diagnosis, Subantarctic, MILLAR (3); *P. lepidoderma* Japan, TOKIOKA (2); *P. microcosmus* ecology, COSTA, PÉRÈS (3); *P. pachydermatina* New Zealand, BREWIN, fouling in New Zealand, SKERMAN; *P. pulla*, *P. rugata* New Zealand, BREWIN; *P. setosa* diagnosis, Antarctic, *P. salebrosa* = *P. bouvetensis*, MILLAR (3); *P. savignyi*, ecology, KERNEIS, PARENZAN (1, 2); *P. squamata* Antarctic, MILLAR (3); *P. squamulosa* ecology, COSTA, PARENZAN (1, 2), PÉRÈS (3); *P. stolonifera*, ENDEAN, S. Africa, MILLAR (3); *P. stubenrauchii* diagnosis, MILLAR (3); *P. subculata* New Zealand, *P. suteri*, BREWIN; *P. tessellata* Norway, BURDON-JONES & TAMBS-LYCHE, ecology, PARENZAN (1); *P. trita*, BREWIN; *P. turqueti* = *P. bouvetensis*, MILLAR (3); *P. vittata* ecology, LABOREL & VACHELET, Ascension Is., MILLAR (3), Japan, TOKIOKA (2).

Molgulidae

Ascopera bouvetensis ? = *A. gigantea*, *A. gigantea* Antarctic, MILLAR (3).

Bostrichobranchus pilularis Massachusetts, SANDERS.

Caesira impura see *Otenicella* and *Molgula*.

Cesira impura see *Otenicella* and *Molgula*.

Otenicella see also *Molgula*; *O. appendiculata* ecology, PÉREZ (2, 3); *O. a. var. korotneffi* ecology, COSTA, PÉREZ (3); *O. impura* ecology [as *Cesira*], PARENZAN (1), see also *Molgula*.

Molgula angulata diagnosis, *M. bacca* Antarctic, MILLAR (3); *M. dolichenra* sp. nov. Nigeria MILLAR (2) pp. 129-131 fig.; *M. falsensis* S. Africa, MILLAR (3); *M. impura* ecology, PARENZAN (1, 2); *M. malvinensis* diagnosis, Antarctic, MILLAR (3); *M. manhattensis*, NICOL (1), PÉREZ (1); *M. mortenseni* New Zealand, BREWIN; *M. occidentalis* diagnosis, *M. pedunculata* diagnosis, Antarctic, non=*M. sabulosa*, MILLAR (3); *M. platei*, MILLAR (2), Chile, MILLAR (3); *M. pyriformis* diagnosis, *M. sabulosa* diagnosis, Australia, non=*M. pedunculata*, MILLAR (3); *M. setigera* forma *georgiana* form. nov. S. Georgia MILLAR (3) pp. 134-135 fig. 58; *M. s. forma marioni* form. nov. Subantarctic MILLAR (3) p. 136 fig. 58; *M. eluiteri* New Zealand, BREWIN.

Paramolgula filholi New Zealand, BREWIN; *P. gregaria* Antarctic, MILLAR (3).

Class THALIACEA

Pyrosoma, NICOL (1), TRÉGOUBOFF (2), feeding and gut, MORTON; *P. sp.* Adriatic, HURE; *P. agassizi*, IVANOVA-KAZAS; *P. atlanticum*, NICOL (1), TOKIOKA (4), TRÉGOUBOFF (1), Mediterranean, FURNESTIN, light emission, NICOL (2); *P. a. atlanticum* abundant near sea-bed 330-640 m deep, main food of fish *Hyperoglyphe porosa* of Australia, COWTER; *P. ellipticum*, *P. fixata*, *P. giganteum*, IVANOVA-KAZAS; *P. indicum*, GODEAUX; *P. spinosum*, GODEAUX, IVANOVA-KAZAS, TOKIOKA (4), light emission, NICOL (2); *P. vitjazi* sp. nov. N.W. Pacific IVANOVA-KAZAS pp. 273-279 figs. 1-4.

Doliolidae

Doliolletta gegenbauri Sierra Leone, BAINBRIDGE, off California, BERNER, N.W. Atlantic, DEEVEY; *D. g. var. tritonis* Red Sea GODEAUX, N. Pacific TOKIOKA (4), New Caledonia TOKIOKA (3); *D. tritonis* [as *Doliolum*] S.W. Africa, bionomics, VAN ZYL; *D. mirabilis*, TOKIOKA (4), TRÉGOUBOFF (1); *D. valdiviae*, TOKIOKA (4).

Doliopsoidea sp. TOKIOKA (4).

Doliolina intermedia [as *Doliolum*], GODEAUX, N. Pacific, TOKIOKA (4); *D. mulleri*, TOKIOKA (4), Sardinia, ANICHINI (4), W. Mediterranean, FURNESTIN, Red Sea, GODEAUX, [as *Doliolum*] ecology, TRÉGOUBOFF (2); *D. m. var. krohni* [as *Doliolum*], TRÉGOUBOFF (1).

Doliolum, NICOL (1), gut and feeding, MORTON; *D. sp.*, ANICHINI (2, 3), nurses, Sardinia, ANICHINI (4); *D. denticulatum* Sardinia, ANICHINI (4), off California, BERNER, W. Mediterranean, FURNESTIN, Red Sea, GODEAUX, Adriatic, HURE, E. Australia, N. Pacific, TOKIOKA (4), ecology, TRÉGOUBOFF (1), S.W. Africa, bionomics, VAN ZYL; *D. ehrenbergi*=*D. denticulatum*, TOKIOKA (4); *D. gegenbauri* see *Doliolletta*; *D. intermedium* see *Doliolina*; *D. mülleri* see *Doliolina*; *D. nazionale* [sic.] Adriatic HURE; *D. nationalis* Sardinia, ANICHINI (4), N.W. Atlantic, DEEVEY, W. Mediterranean, FURNESTIN, ecology, GODEAUX, N. Pacific, TOKIOKA (4), ecology, TRÉGOUBOFF (1), S.W. Africa, bionomics, VAN ZYL.

Salpidae

Brooksia rostrata Red Sea, GODEAUX, N. Pacific, E. Australia, TOKIOKA (4).

Cyclosalpa affinis, *C. florida*, TOKIOKA (4); *C. pinnata* E. Australia, TOKIOKA (4), S.W. Africa, bionomics, VAN ZYL; *C. virgula*, TRÉGOUBOFF (1).

Iasis zonaria [as *Salpa*], SUTTON, N. Pacific, E. Australia, TOKIOKA (4).

Thleia magathanica, TOKIOKA (4), S.W. Africa, bionomics, VAN ZYL; *I. punctata*, TOKIOKA (4).

Metcalfina hexagona, TOKIOKA (4), [as *Salpa*] SUTTON.

Pegae confederata, TRÉGOUBOFF (1), Sardinia, ANICHINI (4), E. Australia, TOKIOKA (4), S.W. Africa, bionomics, VAN ZYL.

Ritteriella amboinensis Red Sea, GODEAUX, N. Pacific, TOKIOKA (4).

Salpa, feeding, MORTON; *S. sp.*, ANICHINI (2, 3); *S. africana* see *S. maxima*; *S. cylindrica* see *Weelia*; *S. democratica* see *Thalia*; *S. fusiformis*, GODEAUX, NICOL (1), TRÉGOUBOFF (1), Sardinia, ANICHINI (4), N.W. Atlantic, DEEVEY, W. Mediterranean, FURNESTIN, Adriatic, HURE, in N. Atlantic Current, KANA'eva, development, SUTTON, N. Pacific, TOKIOKA (4), Norwegian Sea, WIBORG, S.W. Africa, bionomics, VAN ZYL; *S. f. forma aspersa* N. Pacific, TOKIOKA (4); *S. hexagona* see *Metcalfina*; *S. maxima*, SUTTON, TRÉGOUBOFF (1, 2), Red Sea, GODEAUX, Adriatic, HURE, [as *S. africana*] feeding, MORTON, S.W. Africa, bionomics, VAN ZYL; *S. mucronata*=*Thalia democratica*, GODEAUX; *S. vagina* see *Thetys*; *S. zonaria* see *Iasis*.

Thalia democratica, SUTTON, TRÉGOUBOFF (1), Sardinia, ANICHINI (4), Sierra Leone, BAINBRIDGE, N.W. Atlantic, DEEVEY, W. Mediterranean, FURNESTIN, Red Sea, GODEAUX, Adriatic, HURE, in Azores Current and S. Trade Current of Atlantic, KANA'eva, Atlantic, N. Pacific, TOKIOKA (4), ecology, TRÉGOUBOFF (2), S.W. Africa, bionomics, VAN ZYL; *T. d. var. orientalis*, TRÉGOUBOFF (1), Red Sea, GODEAUX, New Caledonia, TOKIOKA (3), N. Pacific, TOKIOKA (4); *T. longicauda* S.W. Africa, bionomics, VAN ZYL.

Thetys vagina, TOKIOKA (4), [as *Salpa*] NICOL (1).

Traustedia multisetulata, TOKIOKA (4).

Weelia cylindrica [as *Salpa*] Sierra Leone, BAINBRIDGE, [as *Salpa*] Red Sea, GODEAUX, [as *Salpa*] N. Pacific, E. Australia, TOKIOKA (4).

Class LARVACEA

Oikopleuridae

Althoffia, TRÉGOUBOFF (1); *A. pacifica*=*Pelagopleura gracilis*, *A. tumida* Atlantic, N. Pacific, TOKIOKA (4).

Bathochordaeus sp. N. Pacific, *B. charon* Gulf of Mexico, *B. stygius*=*B. charon*, TOKIOKA (4).

Chunopleura microgaster Indian Ocean, TOKIOKA (4).

Coecaria subgenus of *Oikopleura* q.v.

Folia gracilis Atlantic, N. Pacific, TOKIOKA (4).

Haplopleura gut and feeding, MORTON.

Megalocercus abyssorum, TRÉGOUBOFF (1), Red Sea (first record), FENAUX (2), N. Pacific, TOKIOKA (4);

M. atlanticus = *M. abyssorum*, *M. diegensis* = *Stegosoma magnum*, TOKIOKA (4); *M. huxleyi* Red Sea, FENAU (2), N. Pacific, TOKIOKA (4).

Oikopleura, LEGARÉ & MACLELLAN, NICOL (1), TRÉGOUBOFF (1), feeding and gut, MORTON; *O. sp.* Sardinia, ANICHINI (1-4), Black Sea, BĂCESCU *et al.*; *O. spp.* Benguela Current, HART & CURRIE; *O. albicans*, NICOL (1), TRÉGOUBOFF (1), Adriatic, HURE, Atlantic, N. Pacific, ? = *O. labradoriensis*, TOKIOKA (4); *O. californica* = *O. graciloides*, *O. chamissonis* = *O. labradoriensis*, TOKIOKA (4); *O. cophocerca*, TRÉGOUBOFF (1), Adriatic, HURE, Atlantic, N. Pacific, TOKIOKA (4); *O. dioca*, ANGELIS & VALLE, TRÉGOUBOFF (1), Black Sea, BĂCESCU *et al.*, Sierra Leone, BAINBRIDGE, N.W. Atlantic, DEEVEY, E. Mediterranean, FENAU (2), Adriatic, HURE, gut and feeding, MORTON, New Caledonia, TOKIOKA (3), Atlantic, N. Pacific, TOKIOKA (4); *O. fusiformis* TRÉGOUBOFF (1), New Caledonia, TOKIOKA (3), Atlantic, N. Pacific, TOKIOKA (4); *O. f. forma cornuogastera* N. Pacific, *O. gracilis* Atlantic, N. Pacific, *O. graciloides*, N. Pacific, TOKIOKA (4); *O. intermedia*, TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4); *O. labradoriensis* N.W. Atlantic, DEEVEY, Subantarctic, N. Pacific, TOKIOKA (4); *O. longicauda*, TRÉGOUBOFF (1), Sierra Leone, BAINBRIDGE, N.W. Atlantic, DEEVEY, E. Mediterranean, FENAU (2), W. Mediterranean, FURNESTIN, gut histology, MORTON, Adriatic, HURE, New Caledonia, TOKIOKA (3), Atlantic, N. Pacific, TOKIOKA (4); *O. magna* = *Stegosoma magnum*, *O. mediterranea*, TOKIOKA (4); *O. parva* New Caledonia, TOKIOKA (3), Atlantic, N. Pacific, TOKIOKA (4); *O. rufescens*, TRÉGOUBOFF (1), Red Sea, FENAU (2), Atlantic, N. Pacific, TOKIOKA (4); *O. tortugensis* = *O. intermedia*, TOKIOKA (4); *O. vanhoeffeni*, ANGELIS & VALLE; *O. velifera* = *O. longicauda*, TOKIOKA (4).

Pelagopleura gracilis includes *Althoffia pacifica*, TOKIOKA (4); *P. haranti*, TOKIOKA (4); TRÉGOUBOFF (1), *P. oppressa*, *P. verticalis*, N. Pacific, TOKIOKA (4).

Sinisteroffia scrippsii N. Pacific, TOKIOKA (4).

Stegosoma, TRÉGOUBOFF (1); *S. sp.*, TRÉGOUBOFF (2); *S. conogaster* = *S. magnum*, TOKIOKA (4); *S. magnum*, TRÉGOUBOFF (1), Adriatic, HURE, New Caledonia, TOKIOKA (3), Atlantic, N. Pacific, includes *Megalocercus diegensis*, TOKIOKA (4).

Vezillaria subgenus of *Oikopleura* q.v.

Fritillariidae

Acrocercus subgenus of *Fritillaria* q.v.

Appendicularia, NICOL (1); *A. sicula*, ANGELIS & VALLE, FENAU (1), TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4); *A. tregouboffi* sp. nov. Mediterranean FENAU (1) pp. 120-122 figs. 1-3.

Euryercus subgenus of *Fritillaria* q.v.

Fritillaria, LEGARÉ & MACLELLAN, TRÉGOUBOFF (1); *F. sp.* Sardinia, ANICHINI (1-4); *F. spp.* Benguela Current, HART & CURRIE; *F. abjornseni* Atlantic, N. Pacific, *F. aberrans* N. Pacific, TOKIOKA (4); *F. aequatorialis*, TRÉGOUBOFF (1), Atlantic, TOKIOKA (4); *F. amygdala* = *F. abjornseni*, *F. angularis* = *F. borealis sargassi*, *F. arafuora* N. Pacific,

F. artus = *F. borealis*, *F. bicornis* = *F. venusta*, TOKIOKA (4); *F. borealis* N.W. Atlantic, DEEVEY; *F. b. acuta* forma *typica* var. *mediterranea*, TRÉGOUBOFF (1); *F. b. forma intermedia* N. Pacific, TOKIOKA (4); *F. b. forma sargassi* Atlantic, N. Pacific, TOKIOKA (4), New Caledonia, TOKIOKA (3); *F. b. truncata* forma *crassa*, TRÉGOUBOFF (1); *F. b. forma typica*, Subantarctic, N. Pacific, TOKIOKA (4); *F. brevicollis* = *F. borealis*, *F. campila* = *F. haplostoma* or = *F. abjornseni*, *F. charybdae* N. Pacific, *F. claudaria* = *F. borealis intermedia*, *F. clava* = *F. borealis sargassi*, *F. delicata* = *F. haplostoma* or = *F. borealis*, *F. diafana* = *F. borealis sargassi*, *F. disparia* = *F. megachile*, *F. drygalski*, *F. exilis* = *F. borealis*, TOKIOKA (4); *F. formica*, TRÉGOUBOFF (1), Atlantic, TOKIOKA (4); *F. f. forma digitata* N. Pacific, TOKIOKA (4); *F. f. forma digitata et tuberculata*, TRÉGOUBOFF (1); *F. fraudaz*, TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4); *F. furcata* = *F. pellucida*, *F. gigas* = *F. borealis intermedia*, TOKIOKA (4); *F. gracilis*, TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4); *F. haplostoma* Sierra Leone, BAINBRIDGE, Atlantic, N. Pacific, TOKIOKA (4); *F. helenae*, *F. incerta* = *F. venusta*, *F. juncea* = *F. borealis intermedia*, *F. limpida* = *F. haplostoma*, *F. lohmanni* = *F. abjornseni*, *F. lucibila* = *F. haplostoma*, *F. macrotrachela* = *F. megachile*, *F. megachile* N. Pacific, *F. mesanensis* ? = *F. borealis intermedia*, *F. nitida* = *F. borealis*, *F. pacifica* N. Pacific, TOKIOKA (4); *F. pellucida*, TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4); *F. plana* = *F. borealis sargassi*, *F. pulchritudo* = *F. borealis*, *F. ritteri* = *F. borealis sargassi*, *F. sargassi* = *F. borealis* forma *sargassi*, *F. tacita* = *F. haplostoma* or = *F. abjornseni*, *F. tenebra* = *F. borealis*, *F. tenella* Atlantic, N. Pacific, *F. tereta* = *F. abjornseni*, *F. trigonis* = *F. borealis sargassi*, *F. truncata* ? = *F. haplostoma*, *F. urticans*, *F. velocita* = *F. borealis sargassi*, TOKIOKA (4); *F. venusta*, TRÉGOUBOFF (1), Atlantic, N. Pacific, TOKIOKA (4).

Tectillaria fertilis Atlantic, N. Pacific, *T. taeniogona* N. Pacific, TOKIOKA (4).

Kowalevskaiidae

Kowalevskia mosi = *K. tenuis*, *K. oceanica*, *K. tenuis* Atlantic, N. Pacific, TOKIOKA (4).

SUBPHYLUM CEPHALOCHORDATA

Phylogeny, BONE (1).

Branchiostomatidae

Amphioxus, IVANOV (3), iodine in endostyle, BARRINGTON & BARRON, central nervous system, BONE (2), peripheral nerves, BONE (3), near Sète (W. Mediterranean) FIZE.

Asymmetron, gut and feeding, MORTON.

Branchiostoma see also *Amphioxus*; *B. belcheri*, DALCQ, presumptive areas of egg, TUNG *et al.*; *B. lanceolatum*, BONE (1), NICOL (1), larvae in plankton off Sardinia, DELLA CROCE, thyroid hormones, CORELLI *et al.*, ecology KERNIS, PÉRÉS (4), presumptive areas of egg, TUNG *et al.*, ultrastructure of muscle, ZAFF & MOHAMED.



